



**US Army Corps  
of Engineers**

St. Louis District

**ENVIRONMENTAL ASSESSMENT  
WITH  
DRAFT FINDING OF NO SIGNIFICANT IMPACT**

**Alton to Gale Organized Levee Districts, Illinois and  
Missouri (Continuing, Deficiency Corrections) Letter  
Report**

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## **TABLE OF CONTENTS**

### **References**

1.0 Purpose and Need for Action .....	EA-1
1.1 Project Location .....	EA-3
1.2 Project Authority .....	EA-3
2.0 Alternatives Including the Proposed Action .....	EA-6
2.1 Description of the Alternatives .....	EA-6
2.2 Proposed Action/Recommended Alternative .....	EA-9
3.0 Affected Environment and Environmental Consequences .....	EA-14
3.1 Threatened and Endangered Species .....	EA-14
3.2 Noise and Air Quality .....	EA-20
3.3 Water Quality and Aquatic Impacts .....	EA-21
3.4 Soils and Prime Farmland .....	EA-24
3.5 Physiography-Topography .....	EA-25
3.6 Terrestrial Impacts .....	EA-25
3.7 National Forest and Conservation Areas .....	EA-27
3.8 Cultural and Historic Resources .....	EA-28
3.9 Socioeconomic Issues .....	EA-31
3.10 Aesthetic Resources .....	EA-33
3.11 Recreation .....	EA-34
3.12 Hazardous, Toxic and Radioactive Waste Sites (HTRW) .....	EA-34
3.13 Cumulative Impacts .....	EA-35
3.14 Compliance .....	EA-38
References .....	EA-44

### Finding of No Significant Impact (FONSI)

### **FIGURES**

EA-1 Typical levee slides .....	EA-2
EA-2 Alton to Gale Organized Levee Districts with design deficiency slides .....	EA-4
EA-3 Lime/Fly-Ash Injection Technique – Alternative (4) .....	EA-12
EA-4 Levee cross sections for Alternatives 1-4 .....	EA-13

**TABLES**

EA-1 Station numbers and repair lengths of slides within the Alton to Gale Organized Levee Districts. ....	EA-5
EA-2 List of federally threatened and endangered species and their habitat provided by USFWS on 7 August, 2008.....	EA-15
EA-3 Complianace review with all applicable environmental regulations and guidelines .....	EA-42

**APPENDICES**

EA-A – Pertinent Correspondence.....	EA-A-1
EA-B – Illinois and Missouri Species of Concern.....	EA-B-1

## REFERENCES.

Subject: Alton to Gale Organized Levee Districts, Illinois and Missouri (Continuing, Deficiency Corrections) Letter Report

Thru: Commander, Mississippi Valley Division

Attn: CEMVD-MD-PM

To: CDR USACE (DAEN-CWO-E)

Washington DC 20314-0999

- a. Letter Report, LMSEM/LMSED-DG, 1 October 1979, subject as above, with endorsements thereto
- b. b. Letter Report, LMSED-PK, 21 November 1986, subject as above, with endorsements thereto (Appendix 1 Main Report).
- c. c. Engineer Regulation (ER) 1165-2-119, Modifications to Completed Projects.
- d. d. Policy on Correction of Project Deficiencies in Completed Projects that are Operated and Maintained by Local Interests (DAEN-CWR Policy Issue 80-16).
- e. e. Assistant Secretary of the Army (ASA) (Civil Works) Memorandum for the Deputy Commander for Civil Works, dated 8 November 2000 (Appendix 2 Main Report).

## 1.0 PURPOSE AND NEED FOR ACTION

The U.S. Army Corps of Engineers, St. Louis District (Corps), has prepared this updated Environmental Assessment (EA) to address the correction of a design deficiency involving the use of inappropriate, high plasticity clays during the construction of numerous levee reaches in the Alton-to-Gale Organized Levee Districts. This EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's Regulations (40 Code of Federal Regulations [CFR] 1500-1508), as reflected in the USACE Engineering Regulation (ER) 200-2-2 "Procedures for Implementing NEPA" and ER 1105-2-100 "Planning Guidance Notebook." The following sections include a discussion of the purpose and need, authority, alternatives, affected resources, and impacts of the recommended action and other alternatives. Under the recommended action, no adverse environmental impacts are expected and no mitigation would be required.

The purpose of the project is to repair levee slides in this large, federally constructed, but locally maintained levee system. All levees have heights ranging between 20' and 25', a crown width of 20 feet and side slopes of 1 vertical on 3 horizontal. During construction of these levees locally available materials were used which include highly plastic clays. Highly plastic clays have low residual long-term shear strengths required for proper stability, and embankments in these highly plastic clays require slopes no steeper than 1 vertical on 4 horizontal. As a result, the extreme volume changes, or shrink-swell potential, allows for the formation of deep cracks in the levee during periods of low rainfall. These cracks then fill with water from rain, snowmelt, and floods, which contributes to the continual reduction of embankment strength from pooling within the

cracks while the water is absorbed. As the clay soils in the upper portions of the embankment absorb water and gain weight, the clays at and near the bottom of the embankment lose shear strength. When the embankment weight exceeds the underlying shear strengths, embankment movement (slides) occurs compromising the integrity of the levee. Numerous slides have been repaired throughout the years, the latest in 2008 (Figure EA-1). In the past, the high plasticity soils were replaced with low to medium plasticity soils or the plasticity of the clay soils would be chemically modified with hydrated lime for stabilization. Numerous alternatives, from no action to removal and replacement of the impacted levee segment have been considered. In order to lower the risk of failure and meet the standard Corps of Engineers criteria for flood control projects, the most current recommendation involves a lime/fly-ash injection technique. This method involves injecting a slurry of hydrated lime and fly-ash at regular intervals into the levee slope using a series of injector rods on a track-mounted vehicle.

Stable levee embankment slopes are required for flood control projects to maintain adequate cross sectional area for the retention of floodwaters. The proposed repairs would be accomplished within the existing levee reaches located in the Alton to Gale levee system. Other than correcting the design deficiency through the modification of the high plasticity clay soils and the associated work to establish the turf, no additional work would be accomplished.



*Figure EA- 1 – Typical levee slides*

## 1.1 Project Location

The Alton to Gale Levee System is made up of seventeen small levees grouped together into a combined 200+ mile system on the Middle Mississippi River in the states of Illinois and Missouri. Eleven of these levee districts are addressed in this EA (Figure 2). The levees are all located along the Mississippi River, extending from Alton, Illinois, (Mississippi River Mile 203) to Gale, Illinois, (Mississippi River Mile 46). All eleven are located in Illinois except for the Boise Brule Drainage and Levee District (D&LD) which is located in Perry County, Missouri. Portions of the Alton to Gale levee system, specifically the back levee along the Big Muddy River in the Degognia-Fountain Bluff D&LD and Grand Tower D&LD, a portion of the lower flank levee in the Metro East D&LD, and a portion of the upper flank levee in the Prairie Du Rocher D&LD, have experienced a significant number of slides which have severely reduced the ability of these systems to continuously provide the authorized level (varies among D&LD's) of flood protection.

The St. Louis District has had an on going program to inspect the levees and document the existence of levee slides since 1961. Most of the levee slides reoccur within the same levee district reaches time and time again. The levee reaches that have had continuous problems with slope instability and slides are listed in Table 1. The risks of failure and their consequences are evaluated in this report based on long-term engineering solutions. Approval is sought to correct the continual occurrence of these levee slides in the specific levee reaches where it has been documented that the wrong type of embankment material was used in the original construction.

## 1.2 Project Authority

The authority for this project lies in the Flood Control Acts of 1936, 1938 and 1946 for the original construction of the eleven Alton to Gale D&LD's. The Flood Control Act of 22 June 1936 authorized flood protection for the following levee districts: Bois Brule, Clear Creek, Degognia/Fountain Bluff, East Cape Girardeau, Metro East Sanitary District, Fort Chartres, and Preston. The Flood Control Act of 28 June 1938 authorized flood protection for the Grand Tower, Kaskaskia Island, and Wood River D&LD's. The Flood Control Act of 24 July 1946 authorized flood protection for Prairie Du Rocher. Further, Engineer Regulation (ER) 1165-2-119 that addresses "Modifications to Completed Projects," states that, "*Occasionally, a project may deserve modification because its original development was inherently deficient.*" Works proposed to correct a design or construction deficiency may be recommended for accomplishment under existing authorization without further Congressional authorization if the proposed action meets all of the conditions of the ER.

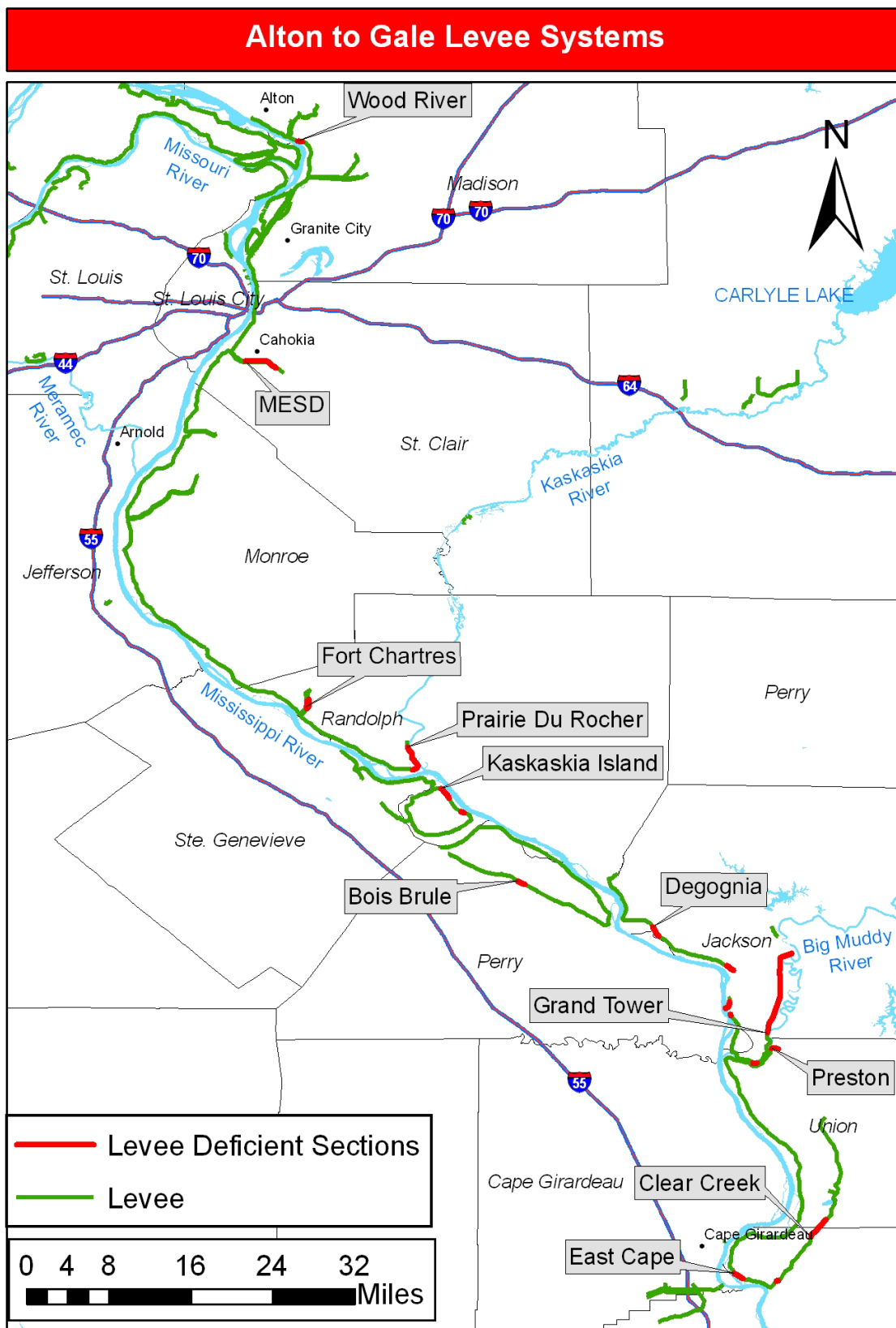


Figure EA-2. Alton to Gale Organized Levee Districts with design deficiency slides.

<b>Alton to Gale Levee Districts</b>	<b>Levee Repair Reach Stationing (Sta.)</b>	<b>Repair Length Linear Feet</b>
Bois Brule D&LD	Sta 1385+00 to Sta 1420+00	3,500 LF
Clear Creek D&LD	Sta 272+00 to Sta 385+00	11,300 LF
Degognia/Fountain Bluff D&LD	Sta 410+00 to Sta 465+00	5,500 LF
	Sta 790+00 to Sta 826+00	3,600 LF
	Sta 947+00 to Sta 1070+00	12,300 LF
East Cape Girardeau D&LD	Sta 355+00 to Sta 400+00	4,500 LF
	Sta 570+00 to Sta 575+00	500 LF
Fort Chartres D&LD	Sta 595+00 to Sta 625+00	3,000 LF
Grand Tower D&LD	Sta 25+00 to Sta 70+00	4,500 LF
	Sta 104+00 to Sta 110+00	600 LF
	Sta 425+00 to Sta 442+00	1,700 LF
	Sta 628+00 to Sta 947+00	31,900 LF
Kaskaskia Island L&D	Sta 335+00 to Sta 395+00	6,000 LF
	Sta 480+00 to Sta 496+00	1,600 LF
MESD (E. St louis D&LD)	Sta 1390+00 to Sta 1530+00	14,000 LF
Prairie du Rocher D&LD	Sta 58+00 to Sta 110+00	5,200 LF
	Sta 700+00 to Sta 840+00	14,000 LF
Preston D&LD	Sta 0+00 to Sta 25+00	2,500 LF
Wood River D&LD	Sta 198+00 to Sta 218+00	2,000 LF
<b>Alton to Gale Levee Districts</b>	<b>Total Length</b>	<b>128,200 LF</b>

***Table EA-1. Station numbers and repair lengths of slides within the Alton to Gale Organized Levee Districts.***



## **2.0 ALTERNATIVES INCLUDED IN THE PROPOSED ACTION**

The NEPA requires that in analyzing alternatives to a proposed action, a federal agency consider an alternative of “No Action.” Likewise, Section 73 of the Water Resources Development Act of 1974 (PL93-251) requires federal agencies to give consideration to non-structural measures to reduce or prevent flood damage. Nonstructural measures reduce flood damages without significantly altering the nature or extent of flooding. Damage reduction from nonstructural measures is accomplished by changing the use made of the floodplains or by accommodating existing uses to the flood hazard. Examples are flood proofing, relocation of structures, flood warning and preparedness systems, and regulation of floodplain uses. A flood warning system would do little to reduce structural and agricultural damages. Flood proofing or relocation is not desirable to the D&LD Districts, would have large costs, and result in loss of numerous acres of prime farmland. Therefore, nonstructural alternatives were eliminated from further consideration.

### **2.1 Description of the Alternatives**

#### **2.1.1 General**

Other than the No Action alternative, there were four practicable action plans investigated for repairing levee reaches experiencing excessive slope failures because of design deficiency. These alternatives would ensure the Corps authorized level of protection with a sufficient factor of safety.

#### **2.1.2 No Action**

Under the No Action Alternative, the federal government would not provide 100% funding to repair the design deficiencies of the Alton to Gale levee system. Repairs then would be up to the individual levee districts on a 65%-federal and 35%-levee district cost share. Because of this, it is possible that local funding would not be available or adequate to complete the design deficiency repairs in a safe, timely manner, restoring the levees to their designed level of protection. It is also anticipated that if levee sections composed of the high plastic clays are left unrepaired, new levee slides would develop and existing slides would erode further. This reduced level of levee integrity would increase flood risks throughout the project area.

Numerous areas within the Alton to Gale levee system are deficient and unstable as exhibited by continuous levee slope failures which began shortly after the levees were constructed. The consequences of levee failure and breach in the flood protection system would be detrimental to health, safety, environmental, and economic viability for the protected cities, towns, villages, industry, transportation, and commercial enterprises. Chief industrial facilities in the levee system include petroleum storage facilities, chemical plants, and metals production plants. Rural and agricultural economies would

be impacted for years after flooding. Quite often levee slides encroach into the levee crowns resulting in a breach of the road system and a safety issue for the traveling public. There are also numerous historic and cultural resources within these same protected areas.

The current practice of repairing individual levee slides does not address the vulnerability of continuous and impending levee slide failures prior to and during flood events. Historically, several years may pass from the time a levee slide occurs and when approval and funding becomes available to repair the slide, leaving the levee section vulnerable during a flood event. In addition, the present approach of repairing levee slides after they occur is only a short term solution, as levee slides continue to occur in the deficient levee sections. Future odds increase that a significant failure could occur under the no action alternative. Public safety would continue to be jeopardized.

### **2.1.3 Alternative Action Plans**

There are four alternative action plans for repairing levee reaches experiencing excessive slope failures that were considered. These are the only alternatives identified that would ensure the authorized level of protection. The first alternative plan is to degrade the affected levee reach by excavating the entire levee embankment material down to natural ground, modify the soils by mixing in a hydrated lime, backfilling these modified materials, and compacting the fill in place. The second alternative is to excavate the upper levee embankment materials down a minimum of seven feet, modify plasticity of the soils by mixing in a hydrated lime, backfilling these modified materials, and compacting the fill in place. The third alternative is to remove and discard the upper levee embankment materials down a minimum of seven feet, replace the high plasticity clays with suitable borrow material and compacting the fill in place. The fourth alternative involves the injection of a lime/fly-ash slurry into the levee sideslope using a series of injector rods on a track mounted vehicle. The cross-sections for alternative's 1-3 can be seen in Figure EA-4. The lime/fly-ash technique is shown in Figure EA-3.

#### **2.13.1 Alternative (1). Lime Stabilization of Entire Levee Section**

The first alternative would be to reconstruct the entire levee sections containing high plasticity clays with the double application of hydrated lime stabilization method. The highly plastic materials would be excavated from the levee down 5 feet below the natural ground surface. This material would be mixed with hydrated lime and stockpiled. Prior to placement in the levee embankment, a second application of hydrated lime would be mixed with the stockpiled modified materials. The hydrated lime would be added in a ratio of 16 pounds of lime per square yard for each ten inch lift. This material would then be placed at the specified moisture content and compacted in place. Modifying the existing highly plastic materials that make up the upper levee section with the hydrated lime would diminish the unacceptable shrinkage and swelling characteristics that presently exist (Figure EA-4). This plan would require the acquisition of real estate interests for construction and right-of-way.

#### **2.1.3.2 Alternative (2). Lime Stabilization of the Upper Levee Section**

The second alternative would be excavation and reconstruction of the upper 7 feet of all levee sections containing high plasticity clays with the lime stabilization method. The excavation would extend ten feet beyond the levee toe and 5 feet below the natural ground surface to effectively key-in the reconstructed material. The excavated material would be mixed with hydrated lime and stockpiled. Prior to placement in the levee embankment, a second application of hydrated lime would be mixed with the stockpiled modified materials. The hydrated lime would be added in a ratio of 16 pounds of lime per square yard for each ten inch lift. This material would then be placed at the specified moisture content and compacted in place. Modifying the existing highly plastic materials that make up the upper levee section with the hydrated lime would diminish the unacceptable shrinkage and swelling characteristics that presently exist (Figure EA-4). This plan would require the acquisition of real estate interests for construction and right-of-way.

#### **2.1.3.3 Alternative (3). Replacement of the Upper Levee Section**

The third alternative would remove and discard the upper 7 feet of all levee sections containing high plasticity clays. The excavation would extend ten feet beyond the levee toe and 5 feet below the natural ground surface to effectively key-in the reconstructed material. The upper levee section would be replaced with suitable levee embankment materials obtained from new borrow sources. These suitable materials would consist of low to medium plastic clays. The suitable borrow materials would be excavated, placed at the specified water content, and compacted in place (Figure EA-4). The borrow areas would be reclaimed by the soils removed from the deficient levee section. This plan would require the acquisition of real estate interests for construction right-of-way, and for new borrow areas.

#### **2.1.3.4 Alternative (4). Lime/Fly-Ash Injection Technique**

The lime/fly-ash injection alternative is a construction method that involves injecting a slurry of hydrated lime and fly-ash at regular intervals into the levee slope using a series of injector rods on a track-mounted vehicle. The typical injection depth will be 10 feet but may need to be revised in those reaches where the slide failure planes have been found deeper. The injector rods have tips capable of dispersing slurry in a 360-degree pattern. The injector is equipped with a pressure gauge that measures and allows monitoring of the slurry injection pressure (Figure EA-3). When lime/fly-ash slurry is injected into expansive clays, it fills the cracks that form as a result of shrinking and swelling. A chemical reaction takes place between the calcium hydroxide (lime) and the silica and alumina naturally occurring in the clay. The materials combine to form calcium silica hydrates and calcium silica aluminates. These are stabilizing compounds that result in increased shear strength in the weakness planes. This method has been used for several years in another Corps' District and has proven highly effective in stabilizing levees of this type.

## **2.2 Proposed Action/Recommended Alternative**

The "No Action" alternative was considered unacceptable because of the high risk of significant levee failure during floods associated with unrepaired levee slides. The consequences of levee failure relative to health, safety, environmental, and economic viability for the protected cities, towns, villages, industry, transportation, and commercial enterprises were too great to accept. The high plasticity soils must be replaced or chemically modified to lower the risk of failure and meet the standard Corps of Engineers criteria for flood control projects.

Action alternative four was chosen as the Recommended Alternative (4) because it achieved the same level of repair integrity as any of the other alternatives but with less construction cost and adverse environmental impacts. Additional details regarding this alternative are as follows:

### ***Construction Details***

#### ***Fly Ash***

Fly ash is a fine, powdery pozzolanic material made of silica, alumina, iron, and calcium. A pozzolan is a siliceous or siliceous/aluminous material that, when mixed with lime and water, forms a cementitious compound. A pozzolan requires the addition of lime to create the cementitious compound; cement requires only water to begin the binding and hardening process. Fly ash is a byproduct of coal burning at utility plants. As coal is burned, non-combustible mineral impurities in coal evaporate and condense into tiny particles of glass, almost totally spherical in shape. The fly ash particles are removed from the exhaust stream in bag houses or electrostatic precipitators and then stored for later shipment.

For this project, a Class C ash would be used for soil stabilization. Lime/fly-ash would be proportioned at the ratio of 1 part lime to 3 parts fly-ash and would be mixed into slurry in the range of 6 to 8 pounds lime/fly-ash per gallon of water. Use of less than 6 pounds and more than 8 pounds of lime/fly-ash per gallon of water may be used, subject to approval by the Contracting Officer. The lime/fly-ash slurry would be continuously agitated during each working day.

In the U.S., the use of fly ash on federal funded projects is encouraged by their classification as a "recovered" product under the federal Resource Conservation and Recovery Act. Fly ash has been used for over 20 years by the Army Corps of Engineers and for countless highway and subgrade applications. Because of the chemical reaction that takes place with lime, fly-ash, and water, trace heavy metals are locked into the cement matrix, no longer able to leach into the ground. Fine dust particles, as well, would be bound rather than released into the air.

Supply and mix tanks would be equipped with a mechanical agitation system capable of producing and maintaining a uniform mix. The supply tank would have the capability of

transferring the lime/fly-ash slurry to the injector unit at the required pressure and in the necessary quantities. The tanks would be located and operated in such a manner as to prevent damage to the environment. Berms or other required protection would be provided to prevent spills and excess slurry from entering any wooded areas or watercourses.

#### *Right Of Way*

All lands, easements, or right-of-way's (ROW), required for construction and maintenance and operation of the project would be provided by the non-federal sponsors (NFS) in coordination with the Contractor and the Corps. If the staging areas need to be moved along the levee, they would remain within the existing levee ROW. The NFS for the eleven levee districts identified in the report are responsible for providing the minimum real estate interests described in the final ROW drawings that will be prepared by the St. Louis District. Existing lands, easements, or ROW is held by the NFS in the form of fee estates and permanent easements.

#### *Staging Areas*

Off levee staging areas for lime/fly-ash slurry mixing and other equipment would be approximately 200ft X 600ft in size. However, at this time the location of staging areas is not known; however, prior to and during construction the contractor will follow guidelines for staging area selection established in the Statement of Work within the awarded contract under the Environmental Protection Plan. It is also possible that a majority of the repair work and staging can take place from the top of the levee. Working exclusively from the top of the levee has been performed in other Corps Districts (Memphis). In general, the Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, as specified by the Contracting Officer, the Contractor shall mark any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the Contractor.

#### *Berm Construction and Tree Protection*

At the toe of each injection area a small containment berm or embankment will be built. No borrow material will be required. This is not a compacted soil structure but a small mound of material that will be scraped from the existing soil cover near the toe of the levee. The injection process produces a small amount of flow from each injection hole. As soon as the operator sees material coming out of the injection hole (point of refusal), they are to stop any further injection. As required, the overflow amounts are kept to a minimum. Any slurry that is running freely on the surface (either around injection rods or out of previous injection holes), is puddled at the toe of the embankment slope, has been spilled, or for any other reason has been judged unsuitable slurry material by the Contracting Officer, shall be defined as wasted slurry. The waste slurry that is puddled at

the toe of the levee slope shall be disposed of in an environmentally safe manner. After construction, the berm is then regraded onto the levee (Figure EA-4).

Importantly, one of the benefits of using the fly-ash technique is that there is no need for construction equipment to encroach past the toe of the levee. At a number of repair sections for this project there are trees at the toe of the levee and outward (batcherlands and fastlands) that must be protected. If a berm cannot be built at these areas because of impacts to trees, the contractor, as an alternative, would be required to use all necessary best management practice's including but not limited to the use of silt fencing and straw bails, to capture and prevent slurry from going beyond the toe of the levee (Figure EA-4).

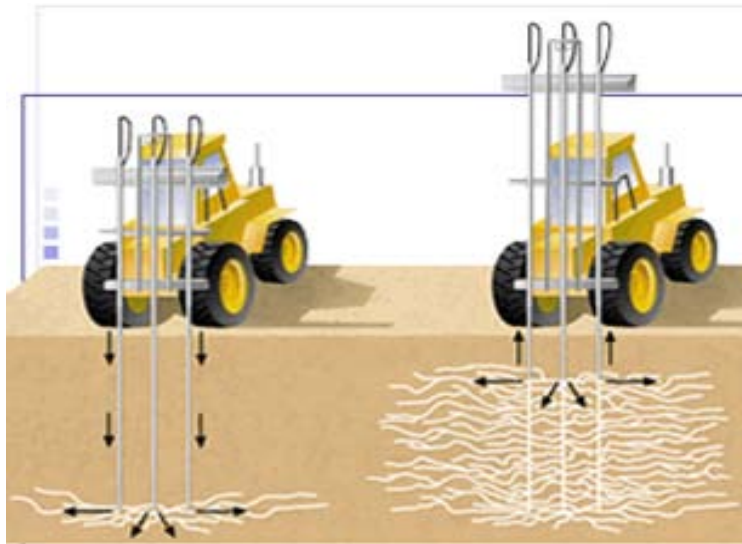
The Contractor would provide all support equipment necessary to keep the work progressing in a smooth and orderly fashion. The equipment may include, but is not limited to, slurry transport trailers, portable pumps, hoses and other related equipment as required. The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The Contractor shall plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. The Contractor shall comply with all applicable environmental Federal, State, and local laws and regulations.

#### ***Repair of existing slides***

In Districts where there are existing slides (Grand Tower and Degognia D&LD's – presently only 5 slides), the slides will need to be repaired before any fly-ash injection takes place. The slides will be repaired by the lime stabilization method. The material will be removed, mixed with hydrated lime, and compacted and replaced in lifts. Any ROW required will be obtained as discussed above.

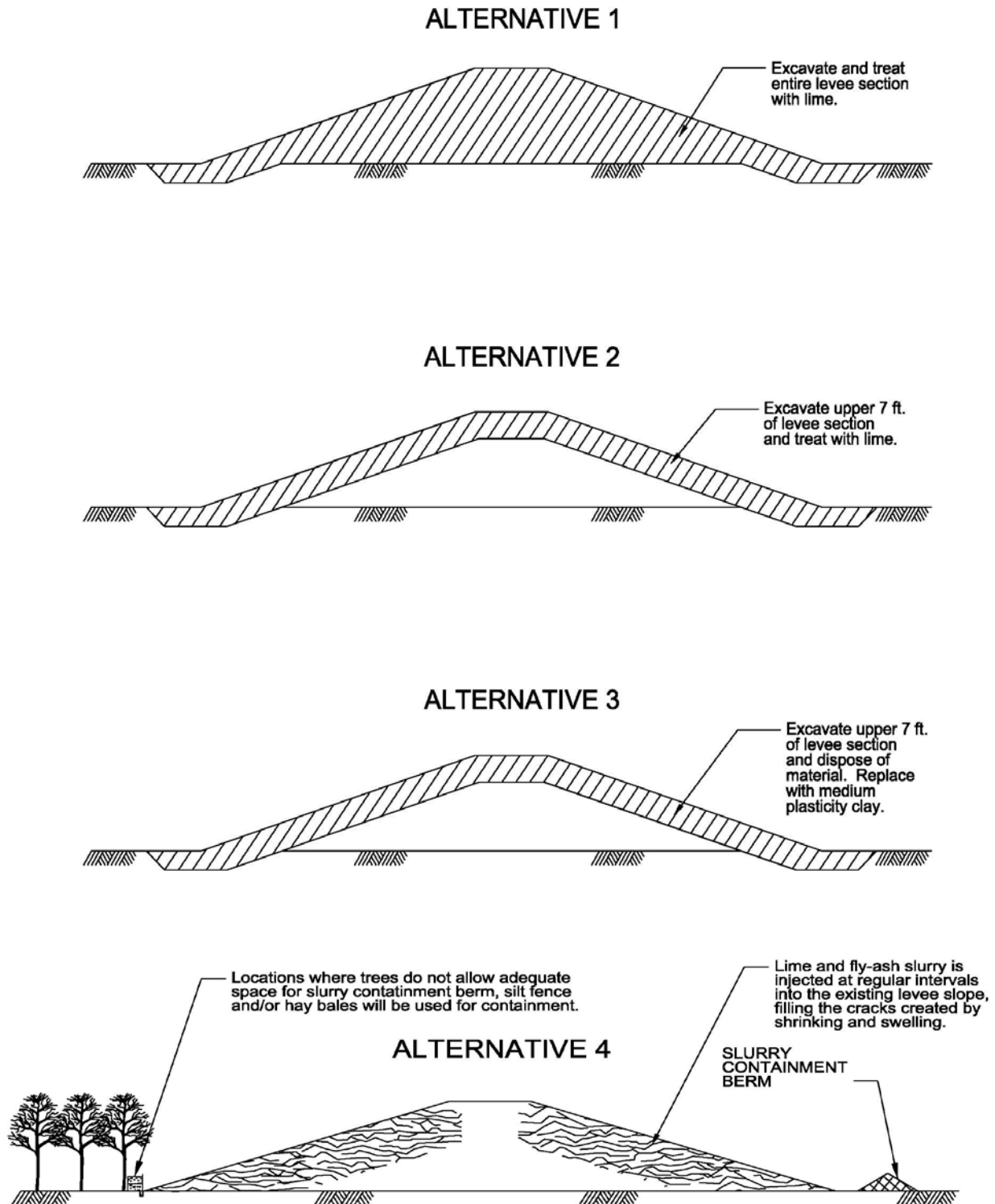
#### ***General Advantages:***

- Minimal ROW required for construction
- Lesser cultural and environmental impact since minimal work is required outside the levee footprint – no tree removal
- Rapid construction
- No excavation required so level of protection is not affected during construction



*Figure EA-3 - Lime/Fly-Ash Injection Technique – Alternative (4)*





*Figure EA- 4. Levee cross sections for Alternatives 1-3*



## **3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

This section identifies the significant resources located in the vicinity of the proposed action, and describes those resources that would be impacted, directly or indirectly, by the proposed levee repairs. Direct impacts are those that are caused by the action taken and occur at the same time and place (40 CFR §1508.8(a)). Indirect impacts are those that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)). Cumulative impacts are further discussed in section 3.13.

The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individual; and the general public.

The Contractor shall minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The Contractor shall be responsible for the protection of threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

### **3.1 Threatened and Endangered Species**

#### **3.1.1 Federal Species**

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District Planning and Environmental Branch requested the U. S. Fish and Wildlife Service provide a list of federally threatened or endangered species that may occur in the vicinity of the proposed project. In an electronic message, dated 7 August, 2008, the U.S. Fish and Wildlife Service (USFWS) (Marion, Illinois) provided this list of species and general habitat preferences (Table 2). Habitat requirements and impacts of the Federal Action alternatives are discussed for each species below. There is no designated critical habitat in the project area at this time for any of these species.

Common Name (Scientific Name)	Classification	General Habitat
Indiana Bat ( <i>Myotis sodalis</i> )	Endangered	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
Gray Bat ( <i>Myotis grisescens</i> )	Endangered	Caves; feeding-rivers/reservoirs adjacent to forests
Interior Least Tern ( <i>Sterna antillarum</i> )	Endangered	Bare alluvial and dredge spoil islands
Pallid Sturgeon ( <i>Scaphirhynchus albus</i> )	Endangered	Large rivers
Decurrent False Aster ( <i>Boltonia decurrens</i> )	Threatened	Disturbed alluvial soils
Illinois Cave Amphipod ( <i>Gammarus acherondytes</i> )	Endangered	Karst caves and streams
Sheepnose ( <i>Plethobasus cyphus</i> )	Candidate	Rivers

**Table EA- 2. List of federally threatened and endangered species and their habitat provided by USFWS on 7 August, 2008.**

**Indiana Bat (*Myotis sodalis*)** forage on flying insects typically along the shorelines of rivers and lakes, in the canopy of trees in floodplains (Humphrey et al. 1977), and in upland forests (Brack and LaVal 1985). In summer, habitat consists of wooded or semi-wooded areas, mainly along streams. Females bear their offspring in hollow trees or under loose bark of living or dead trees. Trees standing in sunny openings are attractive because of warmer air spaces and crevices under the bark. Maternity sites have been reported in riparian areas, floodplain forests, and upland habitats. Limestone caves with pools are preferred for hibernacula during winter (Hall 1962).

#### Future Conditions with No Action

Without implementation of the recommended action no levee repair would be conducted and there would be no adverse impacts to the Indiana Bat. Therefore, the greatest threat to Indiana Bat habitat would result from the breaching of existing or future damaged levees. This could ultimately lead to the flooding of thousands of acres of land and potentially causing considerable negative, as well as positive, impacts to terrestrial plant and animal communities. Negative impacts include mortality of Indiana Bat roosting and maternity trees. Positive impacts of a levee breach would be the return of flood waters to the floodplains currently isolated by levees and the associated ecological benefits to Indiana Bats from the production of invertebrate food sources.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - As planned, deficiency repairs would take place within the footprint of the existing levee and no trees would be impacted. Therefore, the Recommended Alternative (4) is not likely to adversely affect the Indiana bat.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs, including repair of gravity drains, flood gates and seepage berms. If future maintenance and repairs would require tree removal during construction there would be impacts associated with loss of roosting and maternity trees. In addition, speculatively, maintaining reliable, trustworthy levee systems between Alton to Gale would promote social and economic growth and development in the floodplain – ultimately this could have future impacts to Indiana Bat habitat within the project area.

#### Future Conditions with non-recommended Alternatives 1, 2, and/or 3

*Direct Impacts* - Under each of these alternatives there would be the potential and likely adverse impacts to Indiana Bats from tree removal. Maternities and roosting bats are known from a number of the D&LD's, especially the southern districts (Forest Service, Steve Widowski pers. comm.). Because of the required construction procedures, these alternatives would require the removal of roughly 15.5 acres of bottomland hardwoods in the Grand Tower, Degognia, and Prairie Du Rocher D&LD's. The impacts are associated with the need for 15 feet to 30 feet of construction clearance from the levee toe in order to perform the design deficiency repairs. The location(s) of the needed repairs makes impact avoidance impracticable. Site visits have determined that the bottomland hardwoods to be cleared is a mature community comprised of species typical for this habitat type in southern Illinois including ash, hickory, maple, oak and locust of various ages. In addition, specifically for alternative 3, there would potential be additionally adverse impacts to the Indiana Bat from the use of borrow areas.

*Indirect, and Cumulative Impacts* - Same as Recommended Alternative (4).

**Gray Bat (*Myotis grisecens*)** occurs in several Illinois and Missouri counties where it inhabits caves both during summer and winter. This species forages over rivers and reservoirs adjacent to forests.

#### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted there would be no adverse impacts to cave habitats and the Gray Bat. Therefore, the greatest threat to Gray Bat habitat would result from the breaching of existing or future damaged levees. Positive impacts of a levee breach would be the return of flood waters to the floodplains currently isolated by levees and the associated ecological benefits to Gray Bats from the production of invertebrate food sources.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - The repair would take place within the footprint of the existing levee and no caves would be impacted. The Recommended Alternative (4) is not likely to adversely affect the Gray Bat.

*Indirect and Cumulative Impacts* –No future actions are known or anticipated in the project area that would adversely impact the Gray Bat and its habitat.

#### Future Conditions with non-recommended Alternatives 1, 2, and/or 3

*Direct, Indirect, and Cumulative Impacts* - The repair would take place within the footprint of the existing levee and no caves would be impacted. No future actions are anticipated in the project area that would adversely impact the Gray Bat and its habitat

**Interior Least Tern (*Sterna antillarum*)** historic breeding range includes the Mississippi River system (USFWS 1990). Surveys of the Mississippi River have found the majority of breeding colonies occur south of Cairo, IL (Jones 2000). However, breeding birds have been found in Alexander, Union and Jackson County, Illinois, which border the Mississippi River. The terns prefer "bare alluvial islands or sandbars" for nesting and utilize the river, backwater sloughs and fish or stock ponds for foraging. During periods of high river stages, when appropriate sandbar habitat is underwater, birds become more opportunistic in terms of nest site selection. They have utilized agricultural fields and/or county roads provided they are temporary "islands" with water surrounding them in order to inhibit predation of their nests, eggs and young. The project area does not possess sufficient nesting habitat for least terns nor does the surrounding areas support adequate "islands" of habitat preferred in desperate times for the birds. It is possible the birds could forage within the Big Muddy River, but generally they prefer backwater sloughs along the Mississippi or fish or stock ponds. Least terns arrive at breeding grounds in late April and the breeding season is complete by early September (USFWS 1990).

#### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. There would be no adverse impacts to the Interior Least Tern.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - Levee repairs would take place within the footprint of the levee and would not impact any Interior Least Tern habitat. The Recommended Alternative (4) is not likely to adversely affect the Interior Least Tern.

*Indirect and Cumulative Impacts* – No future actions are known or anticipated in the project area that would adversely impact the Interior Least Tern and its habitat.

#### Future Conditions with non-recommended Alternatives 1, 2, and/or 3

*Direct, Indirect, and Cumulative Impacts* - These alternatives would not impact bare alluvial islands or sandbars on the Mississippi River and are not likely to adversely affect the Interior Least Tern. No future actions are anticipated in the project area that would adversely impact the Interior Least Tern and its habitat

**Pallid Sturgeon (*Scaphirhynchus albus*)** are distributed throughout the Mississippi and Missouri River basins but are considered a rarity. Pallid Sturgeon forage for fish along the bottom of large rivers (USFWS 1993). Little is known of adults' habitat preferences and even less is known about spawning locations. Pallid Sturgeon are most frequently caught over a sand bottom, which is the predominant bottom substrate within the species' range on the Mississippi River. Recent tag returns have shown that the species may be using a range of habitats in off-channel areas and tributaries of the Mississippi River (Garvey et al. 2010).

#### Future Conditions with No Action

Without implementation of the recommended action no levee repair would be conducted. Therefore, there would be no impacts to the Pallid Sturgeon.

Recommended Alt. 4 – Levee repairs would take place within the footprint of the levee and would not impact any Pallid Sturgeon habitat. The Recommended Alternative (4) is not likely to adversely affect the Pallid Sturgeon.

Alternatives 1, 2, and 3 – Because there would not be expected impacts to mainstem Mississippi River habitats, these alternatives are not anticipated to impact the Pallid Sturgeon.

**Decurrent False Aster (*Boltonia decurrens*)** is primarily a floodplain perennial endemic to the floodplains of the Illinois River and its confluence with the Mississippi River (Madison and St. Clair Co., Illinois and St. Charles Co., Missouri) (Smith 2000, Mettler-Cherry 2006). A single disjunct population, reported in 1976, but not found since, was known from Cape Girardeau, Missouri, about 195 km down the Mississippi River from St. Louis (Schwegman and Nyboer 1985; USFWS 1990). Nothing is known concerning this population.

#### Future Conditions with No Action

Without implementation of the recommended action no levee repair would be conducted. Therefore, there would be no impacts to the Decurrent False Aster.

Recommended Alt. 4 – It is unlikely that any populations of the Decurrent False Aster occur within the project areas, because most D&LD's are considerably south of existing population center for this species (Smith 2000). In addition, although this species has occasionally been found on levees they generally do not provide suitable habitat (USFWS 1990). Levees slopes are generally dry and would not support Decurrent False Aster

populations over extended time periods (Smith et al.1998). Levee repairs would take place within the footprint of the levee and the Recommended Alternative (4) is not likely to adversely affect the Decurrent False Aster.

Alternatives 1, 2, and 3 – Potentially, adverse impacts to Decurrent False Aster would occur under alternative 3 where borrow sites would be required.

**Illinois Cave Amphipod (*Gammarus acherondytes*)** is listed as endangered in Monroe and St. Clair Counties, Illinois. It is currently known to occur in only a few cave streams of the Illinois sinkhole plain in southwestern Illinois. The contamination of groundwater is probably the greatest threat to this species.

#### Future Conditions with No Action

Without implementation of the recommended action no levee repair would be conducted. Therefore, there would be no impacts to the Illinois Cave Amphipod.

Recommended Alt. 4 – No adverse impacts to this species or its habitat would be anticipated under this alternative.

Alternatives 1, 2, and 3 – No adverse impacts to this species or its habitat would be anticipated under this alternative.

**Sheepnose (*Plethobasus cyphus*)** is a freshwater mussel listed as a candidate species and is now rare in the rivers of its former range in the Midwest. This species inhabits gravel or mixed sand and gravel habitats in medium to large rivers. No adverse impacts to this species or its habitat are anticipated.

#### Future Conditions with No Action

Without implementation of the recommended action no levee repair would be conducted. Therefore, there would be no impacts to the Sheepnose.

Recommended Alt. 4 – No adverse impacts to this species or its river habitat would be anticipated under this alternative

Alternatives 1, 2, and 3 – No adverse impacts to this species or its river habitat would be anticipated under these alternatives.

### **3.1.2 State Species**

A list of Illinois and Missouri endangered, threatened, and special concern species that could potentially occur within the project area can be found in Appendix B. During construction, all attempts would be made to avoid or minimize adverse impacts and disturbance to these species. In the recommended approach, all work can be accomplished from the top and slopes of the levee to inject the lime/fly ash material. See

Section 2.2 for a discussion of staging areas, ROW, and berm construction, and on-site responsibilities of the Contractor. Placement and construction of access roads, staging areas etc., would be coordinated with the Illinois Department of Natural Resources and the Missouri Department of Conservation (in the case of the Boise Brule D&LD) to assure minimal adverse impacts to these species would occur.

## **3.2 Noise and Air Quality**

### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. Therefore, there would be no noise or air quality impacts.

### Future Conditions with Recommended Alt. 4

*Direct Impacts – Air Quality* - Construction activities would cause dust and exhaust fumes from construction equipment. These impacts are considered short term. Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and State air emission and performance laws and standards. The Contractor shall keep construction activities under surveillance, management and control to minimize pollution of air resources. All activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the laws of the State or States in which the work is being performed and all Federal emission and performance laws and standards. In the event that air pollution occurs due to the Contractors actions, the Contractor shall take all necessary steps to rectify the situation to the satisfaction of the Contracting Officer. Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal, State, and/or local allowable limits at all times.

*Noise* - The proposed project would be expected to temporarily increase noise levels near repair sites. The U.S. Environmental Protection Agency has set a limit of 85 decibels on the A scale (the most widely used sound level filter) for eight hours of continuous exposure to protect against permanent hearing loss. Based upon similar construction activities conducted by the Corps in the past, noise above this level would not be expected to occur for periods longer than eight hours. The Contractor shall keep construction activities under surveillance and control to minimize environmental damage by noise. The Contractor shall comply with the local allowable limits, and all rules and provisions of the State or States in which the work is being performed.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs, including repair of gravity drains, flood gates and seepage berms. as well as levee and maintenance – primarily mowing. Speculatively, maintaining reliable, trustworthy levee systems between Alton to Gale promotes social and economic growth and development in the floodplain – ultimately this could have future impacts to noise and air quality.

### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct, Indirect, and Cumulative Impact* - Same as Recommended Alternative (4).

## **3.3 Water Quality and Aquatic Resources**

### *Fly Ash*

Fly ash is a fine, powdery pozzolanic material made of silica, alumina, iron, and calcium. A pozzolan is a siliceous or siliceous/aluminous material that, when mixed with lime and water, forms a cementitious compound. A pozzolan requires the addition of lime to create the cementitious compound; cement requires only water to begin the binding and hardening process. Fly ash is a byproduct of coal burning at utility plants. As coal is burned, non-combustible mineral impurities in coal evaporate and condense into tiny particles of glass, almost totally spherical in shape. The fly ash particles are removed from the exhaust stream in bag houses or electrostatic precipitators and then stored for later shipment.

For this project, a Class C ash would be used for soil stabilization. Lime/fly-ash would be proportioned at the ratio of 1 part lime to 3 parts fly-ash and would be mixed into slurry in the range of 6 to 8 pounds lime/fly-ash per gallon of water. Use of less than 6 pounds and more than 8 pounds of lime/fly-ash per gallon of water may be used, subject to approval by the Contracting Officer. The lime/fly-ash slurry shall be continuously agitated during each working day.

Supply and mix tanks shall be equipped with a mechanical agitation system capable of producing and maintaining a uniform mix. The supply tank shall have the capability of transferring the lime/fly-ash slurry to the injector unit at the required pressure and in the necessary quantities. The tanks shall be located and operated in such a manner as to prevent damage to the environment. Berms or adequate protection shall be provided to prevent spills and excess slurry from entering any wooded areas or watercourses.

The Contractor shall provide all other support equipment necessary to keep the work progressing in a smooth and orderly fashion. The equipment may include, but is not limited to, slurry transport trailers, portable pumps, hoses and other related equipment as required. The location of any staging areas shall be coordinated with the Contracting Officer.

In the U.S., the use of fly ash on federal funded projects is encouraged by their classification as a “recovered” product under the federal Resource Conservation and Recovery Act. Fly ash has been used for over 20 years by the Army Corps of Engineers and for countless highway and subgrade applications. Because of the chemical reaction that takes place with lime, fly-ash, and water, trace heavy metals are locked into the cement matrix, no longer able to leach into the ground. Fine dust particles, as well, would be bound rather than released into the air.



No jurisdictional wetlands, waterways or other Waters of the United States would be affected by the proposed access, repair and construction methods associated with this project. As such, the St. Louis District, Regulatory Branch determined that no Section 404 Clean Water Acts permits would be required to complete the project as proposed.

#### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. Therefore, there would be no water quality impacts caused by construction. However, with no action also comes the risk and increased chance of levee failure. The consequences of levee failure and breach in the flood protection system could have significant impacts on water quality and aquatic resources, primarily associated with pollutants from industrial facilities in the levee system, which include petroleum storage facilities, chemical plants, and metals production plants. Rural and agricultural pollutants could impact water quality and aquatic resources for years after flooding. Alternatively, positive impacts of a levee breach would be the return of flood waters to the floodplains currently isolated by levees and the associated ecological benefits to aquatic resources such as fish spawning habitat, nutrient cycling and deposition, invertebrate production, waterfowl feeding, etc....

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - It is anticipated that construction activities would have no impact on local water quality or other aquatic resources. After injection, lime/fly-ash forms a cementitious compound within hours (primarily depending on temperature) of injection. Although there are waterways and wetlands close and even adjacent to the construction area the Environmental Protection Plan Statement of Work within the awarded contract would require the Contractor to confine all activities to areas defined by the drawings and specifications and detail any issues of concern such as slurry run-off. The Contractor would be required to provide effective protection for waterways and wetlands and cease work if rain is eminent which would cause lime/fly-ash slurry to drain into aquatic areas. The Contractor would minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work would be protected during the entire duration of the contract. The Contractor would plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Further, the Contracting Officer would notify the contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the contractor's Environmental Protection Plan. The contractor would, after receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken.

As described above (section 2.1.3.4), the Contractor would construct small earthen berms along the levee toe for the length of the job and adjacent to drainage channels to eliminate accidental entry of slurry into area watercourses. The earthen berms would be of sufficient size to capture any slurry at the levee toe. Any slurry that is running freely on the surface (either around injection rods or out of previous injection holes), is puddled at the toe of the embankment slope, has been spilled, or for any other reason has been judged unsuitable slurry material by the Contracting Officer, shall be defined as wasted slurry. In situations where trees or wetlands would be impacted by berm construction the Contractor, as an alternative, would be required to use all necessary best management practices including but not limited to the use silt fencing and hay bails, to capture and prevent slurry from going beyond the toe of the levee. No adverse impacts to any type of wetlands are expected during these repairs. The Contractor shall comply with all applicable environmental Federal, State, and local laws and regulations regarding disposal of slurry. Compliance with all Federal, State, and local laws and ordinances is compulsory.

In order to ensure that water quality compliance is maintained, the contractor would supply the appropriate information documenting the quality of the fly ash meets all applicable state and federal standards. All aspects of the mixing and injection process would be documented within the environmental protection plan submittal along with all the best management practices that would be used to minimize the risk associated with this process.

Any slurry that is running freely on the surface (either around injection rods or out of previous injection holes), is puddled at the toe of the embankment slope, has been spilled, or for any other reason has been judged unsuitable slurry material by the Contracting Officer, shall be defined as wasted slurry. The waste slurry that is puddled at the toe of the levee slope shall be disposed of in an environmentally safe manner.

Post-construction, where needed, the levee would be seeded to prevent erosion. Earthwork brought to final grade shall be finished as indicated and specified. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs. Speculatively, maintaining reliable, trustworthy levee systems between Alton to Gale promotes social and economic growth and development in the floodplain – ultimately this could have future impacts to noise and air quality.

#### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct Impacts* - As above, under these alternatives it is anticipated that construction activities would have only minor localized impacts to water quality or other aquatic resources. Repairs could cause short term run-off from erosion if rain should occur during construction. Post-excavation, the levee would be seeded to prevent erosion.

However, under alternative 3 additional impacts to water quality and other aquatics could be possible depending on the selection of borrow areas. Appropriate coordination and mitigation would have to be conducted.

*Indirect and Cumulative Impacts* – Same as Alternative (4), these impacts to water quality and aquatic resources would be associated with future slide or levee repairs.

### **3.4 Soils and Prime Farmland**

#### Future Conditions with No Action

Without implementation of the recommended action, no soils or prime farmland would be impacted from construction. However, as noted in Section 2.1.2, left unrepaired, the unstable levee slopes result in a significantly high risk of levee embankment failure due to the reduced cross sectional area for floodwater retention. Should a failure occur during a high water event, a breach in the flood protection system is highly probable. If one slide area completely fails, the entire area protected by the levee could be completely inundated in a matter of hours potentially impacting thousands of acres of soils and prime farmland. Mississippi River floods are known to deposit thousands of tons of sand over the floodplain (flood of 1993). Soils and prime farmland could also be impacted by pollutants from industrial facilities in the levee system which include petroleum storage facilities, chemical plants, and metals production plants. Rural and agricultural pollutants could impact soils and prime farmland resources for years after flooding.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - Under the Recommended Alternative (4) no agricultural lands or areas of prime farmland would be impacted by construction of the project.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs, depending on the extent of repair and if borrow material would be required. Speculatively, maintaining a reliable, trustworthy levee systems between Alton to Gale promotes social and economic growth and development as well as continued agricultural use of the floodplain – ultimately this could have future impacts to soils and prime farmland.

#### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct* – Same as Recommended Alt. 4.

*Indirect, and Cumulative Impacts* - Only under Alternative 3 would there be the potential for impacts to soils and prime farmland. Again, this would depend on the choice and/or location of borrow site(s).

### 3.5 Physiography-Topography

#### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. Therefore, there would only be changes to physiography-topography under the circumstance of levee breaching during a flood event. Changes to physiography-topography would depend on the duration and magnitude of the flood event.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - All of the levees covered in this environmental assessment were constructed between 1936 and 1965 under provisions of various authorizing legislation. All levees had an average height of 20 feet, a crown width of 20 feet and side slopes of 1V on 3H. The levee and construction and staging areas would be returned to pre-slide conditions after repair work is completed.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs, or future flood events that scour or breach the levees.

#### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct Impacts* - Under these alternatives there would be temporary changes to the topography as a result of levee excavation during construction. Once the soils are mixed with hydrated lime the levee would be re-constructed. Additionally, under alternative 3 there would be the potential for impacts to physiography-topography based on the choice of borrow site(s).

*Indirect, and Cumulative Impacts* - These impacts would be associated with future slide or levee repairs, or future flood events that scour or breach the levees.

### 3.6 Terrestrial Impacts

#### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. Therefore, the greatest terrestrial impact would result from the breaching of existing or future damaged levees. This could ultimately lead to the flooding of thousands of acres of land and potentially causing considerable negative, as well as positive, impacts to terrestrial plant and animal communities. Negative impacts include deposition and scour in wetlands, and wildlife mortalities due to flooding. Also, depending on magnitude and duration of flooding, bottomland and other hardwood forest's known from the areas could also be at risk - thousands of bottomland hardwoods were lost as a result of the flood of 1993 because of the magnitude and duration of the inundation. Positive impacts

of a levee breach would be the return of flood waters to the floodplains currently isolated by levees and the associated ecological benefits such as fish spawning habitat, nutrient cycling and deposition, invertebrate production, waterfowl feeding, etc...

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* – Short-term adverse terrestrial impacts would be expected from construction. A considerable amount of adverse soil disturbance would take place from the crawler-type tractor used for injection. This disturbance will be limited to the levee slopes and crown. The proposed repair area does not generally provide “quality” wildlife habitat because of regular disturbances from mowing and other maintenance activities. Therefore, it is unlikely that the repair area supports significant wildlife populations. Additionally, some wildlife species (small mammals) would surely be temporarily displaced during construction. There would be no adverse impacts to any federally listed threatened or endangered species.

According to the Environmental Plan, the Contractor would confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, as specified by the Contracting Officer, the Contractor would mark any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor would not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys would be fastened to or attached to any trees for anchorage unless specifically authorized. The Contractor would provide effective protection for land and vegetation resources at all times.

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings submitted by the Contractor as part of the Environmental Protection Plan to be preserved, would be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The Contractor would restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

Earthwork brought to final grade would be finished as indicated and specified in the Environmental Plan. Side slopes and back slopes would be protected as soon as practicable upon completion of rough grading. All earthwork would be planned and conducted to minimize the duration of exposure of unprotected soils. Disturbed soils would be replanted with a standard levee/berm seed mix of perennial rye grass, tall fescue, winter wheat, and Bermuda grass.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs. Speculatively, maintaining reliable, trustworthy levee systems between Alton to Gale promotes social and economic growth and development as well as continued agricultural use of the floodplain – ultimately this could have future impacts to terrestrial plant and animal communities throughout the project area.

### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct Impacts* - Considerable terrestrial impacts would be expected under each of these alternatives from tree clearing, hydrated lime mixing, and other construction activities mentioned. Because of the necessary construction actions, these alternatives would require the removal of roughly 15.5 acres of bottomland hardwoods in the Grand Tower, Degognia, and Prairie Du Rocher D&LD's. The impacts are associated with the need for 15 feet to 30 feet of construction clearance from the levee toe in order to grade and work the soil. Vegetation would be completely removed from the work site and impacts to resident wildlife could be significant. In addition, a mitigation plan would need to be implemented. The levee and construction and staging areas would be returned to pre-slide conditions after repair work is completed. Under alternative 3, additional impacts would be expected because of the need for borrow site(s).

*Indirect, and Cumulative Impacts* - Same as Recommended Alternative (4). These impacts would be associated with future slide or levee repairs. Speculatively, maintaining a reliable, trustworthy levee systems between Alton to Gale promotes social and economic growth and development as well as continued agricultural use of the floodplain – ultimately this could have future impacts to terrestrial plant and animal communities throughout the project area.

## **3.7 National Forest and Conservation Areas**

Seven of the levee districts (Degognia and Fountain Bluff, Grand Tower, Preston, Clear Creek, East Cape Girardeau, Miller Pond, and North Alexander levee districts) combined protects 14,000 acres of U.S. Forest Service (USFS) Shawnee National Forest. With a significant portion of the 14,000 acres protected by Grand Tower and Degognia and Fountain Bluff levee districts, these districts are without benefit of any tax revenue from these Federal lands. The Illinois Department of Natural Resources (IDNR) owns and operates over 6,000 acres in the Union County State Fish and Wildlife Area that is protected by Preston, Clear Creek, East Cape Girardeau, Miller Pond, and North Alexander levee districts.

### Future Conditions with No Action

Under the No Action Alternative, the greatest impact to these areas would result from the breaching of existing or future damaged levees. This could ultimately lead to the flooding of thousands of National Forest and Conservation Area lands potentially causing considerable negative, as well as positive, impacts. Negative impacts include deposition and scour in wetlands, and wildlife mortalities due to flooding. Also, depending on magnitude and duration of flooding, bottomland and other hardwood forest's known from the areas could also be at risk - thousands of bottomland hardwoods were lost as a result of the flood of 1993, presumably because of the magnitude and duration of the inundation. Positive impacts of a levee breach would be the return of flood waters to the floodplains currently isolated by levees and the associated ecological benefits such as fish

spawning habitat, nutrient cycling and deposition, invertebrate production, waterfowl feeding, etc....

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* – No direct impacts to these natural areas would occur under this alternative.

*Indirect and Cumulative Impacts* – Adverse impacts would be associated with the continued isolation of the floodplain – preventing seasonal dynamic inundation of the floodplain during high water events. Primarily, levee systems would allow agricultural land-use in areas that normally would not support those practices. Thus this loss of floodplain habitat can be attributed to the functioning levee system.

#### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct, Indirect, and Cumulative Impacts* - Same as Recommended Alternative (4). Adverse impacts would be associated with the continued isolation of the floodplain – preventing seasonal dynamic inundation of the floodplain during high water events. Primarily, levee systems would allow agricultural land-use in areas that normally would not support those practices. Thus this loss of floodplain habitat can be attributed to the functioning levee system.

## **3.8 Cultural and Historic Resources**

### **3.8.1 Description of Existing Environment**

The project area(s) encompasses a long stretch of levees along the Mississippi River. The majority of the deficient levee sites are located in rural, primarily agricultural, areas. However, some are located in urban settings. After the sites to be corrected were identified, record searches for previous archaeological investigations and existing cultural resources in Missouri and Illinois were conducted for the areas adjacent to the deficient sections. A summary of those findings, organized by drainage and levee district are provided below.

**Bois Brule Drainage and Levee District**—There have been limited surveys in the project area associated with drainage ditches and pumping stations.

**Kaskaskia Island Drainage and Levee District**—The nearest survey to the project area occurred on the western side of the district. No sites have been recorded in the vicinity of the project area.

**East Cape Drainage and Levee District**—All levee sections have been surveyed. There are no historic properties within the project area. There would be no significant effects.

Prairie du Rocher /Fort Chartres —Site 11R322 is situated at the southwest end of the deficient levee segment lying along Matthews Road. Along the deficient levee segment paralleling Lock and Dam Rd. there are four sites that, although not immediately adjacent to the levee, might be impacted by construction activities: 11R153, 11R154, 11R175, and 11R176.

Clear Creek Drainage and Levee District—Site 11Un28 is located to the north of the longest levee section. There are no sites recorded in the immediate vicinity of the proposed project location.

Grand Tower Drainage and Levee District— Site 11Ja71 lays between two deficient levee segments along Brunkhorst and Front Streets.

Preston Drainage and Levee District—The relevant levee area has been surveyed and no sites were recorded.

Degognia Drainage and Levee District—There have been no surveys or sites recorded in the vicinity of the deficient levee segments.

Wood River Drainage and Levee District—This area has been extensively surveyed and no sites have been recorded in the project area.

Of the nine districts, the project areas in East Cape, Preston, and Wood River have been surveyed and no sites have been recorded. Bois Brule, Kaskaskia Island, and Degognia have had limited or no surveying near the deficient levee sections. Prairie du Rocher/Fort Chartres, Clear Creek and Grand Tower have known sites in the general vicinity of the deficient levee sections. For the latter six districts, additional historic properties surveys would be required for any construction that occurred off of the disturbed soil of the levee.

### **3.8.2 Environmental Effects of the Alternatives Considered and Recommended Plan**

Each of the non-preferred alternatives would result in moderate to extensive impacts to any cultural resources within the project area. In addition to the earth movement required in reconstructing the levees, removal of all trees and undergrowth within 50 feet of the levee toe would create further potential for impacting historic properties. Any access roads necessary for heavy equipment and any additional borrow areas would require clearance surveys prior to construction. These compliance activities could add materially to the cost of the project.

The preferred alternative of lime-injection technology to repair damaged levees poses the least potential impact to historic properties. Primary access to work areas would be by the levee road system. Access roads for heavy earthmoving equipment would not be required, nor would the additional borrow areas. The elimination of access roads across adjacent areas and reduction in borrow areas will substantially reduce the potential for damage to historic properties. In those cases where the injection must occur from the



slope of the levee, there is a remote possibility of impacting unidentified sites immediately adjacent to the levee via maneuvering of the injection vehicle into position. However, this potential effect will be limited to the disturbed area of the toe of the levee. The temporary containment berm/barrier at the toe of the levee will also be created in this area of disturbed soil. The primary concern is the positioning of staging areas. However, the contracting Statement of Work will specify that vehicle parking and slurry mixing be conducted on the top of the levee unless such action is unfeasible. In that case, the staging areas required for preparation of the lime slurry (and borrow areas required by alternative (4)) will be positioned to avoid impacts to historic properties. Finally, any remaining slurry or run-off will be disposed of in areas where no impacts to historic properties will occur.

### **3.8.3 Issues and Concerns**

For the repair of deficient areas using lime-injection technology (Alternative (4)), there would be no impacts in those areas where the preparation and lime-injection takes place from the top of the levee. Also, since access would be along the existing levee roads, no impacts are anticipated due to equipment movement. As stated in Section 3.8.2, there is a minor possibility for impacts to occur where the injection of the lime slurry must be made from the slope of the levee, dependent upon how far down the slope the equipment must move. There is also the potential for impacts to occur in the staging areas if use of the levee is not feasible.

In the case of those historic properties identified in Section 3.8.1, construction activities associated with Alternative (4) will be coordinated to avoid all impacts. Regarding areas in which no surveys have been conducted, any unanticipated access roads, staging areas, and disposal sites potential impacts are to be addressed in accordance with the programmatic agreement (PA) executed with the Illinois Historic Preservation Agency (IHPA). The PA stipulates the general nature of potential impacts when specific information is unavailable prior to construction and outlines the responsibilities of the signatories and the procedures for ensuring compliance with appropriate statutes and regulations. (See appendix for copies of correspondence with IHPA and copy of PA) [NOTE: TO BE INCLUDED IN FINAL DRAFT]

In addition to the consultation with IHPA, consultation with Native American Tribal organizations is also required to ensure compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. St. Louis District has previously established consultation agreements with 29 tribal organizations that have ties to, or an interest in, the District's region. These tribes were contacted and provided the opportunity to comment on the proposed undertaking (see appendix for correspondence).

## Cultural Resource Compliance

All actions taken for the remediation of the levee deficiencies will be in accordance with the National Historic Preservation Act of 1966, as amended (NHPA). The NHPA requires that any Federal undertaking consider the effects to historic properties and consultation with State Historic Preservation Officers and the Advisory Council on Historic Preservation. This act is further codified in 36 CFR Part 800, *Protection of Historic Properties*. Should any actions result in the collection of data or material from historic properties, such information and objects shall be cared for in accordance with 36 CFR Part 79, *Curation of Federally Owned and Administered Archaeological Collections*.

## 3.9 Socioeconomic Issues

### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. The consequences of levee failure and breach in the flood protection system would be catastrophic to health, safety, environmental, and stifle economic viability for the protected cities, towns, villages, industry, transportation, and commercial enterprises. Rural and agricultural economies could be distressed for years after flooding. There are also numerous historic and cultural resources within these same protected areas

The Federal Government has spent more than \$32 million on individual slide repairs within the levee reaches identified in Table EA-1 that did not lower the amount of risk to the levee districts. Consequences of a levee failure to retain floodwater anywhere along the levee would result in complete inundation of the entire flood protection system. For each flood protection system the losses would be great. For example, the Wood River Levee protects six municipalities, refineries, chemical processing plants, and ammunition plants. The loss of the Wood River Levee system would not only have notable economic impacts in the traditional measurement of losses (current estimate \$1.5 billion dollars) but would have the added implication of creating an environmental contamination scenario not experienced on any inland waterway system to date. When the U.S. EPA was contacted for information on potential effects, they likened such an occurrence to that experienced as a result of the Exxon Valdez. Not only would the land protected by the levee experience significant contamination from oil, oil byproducts and chemicals used in the refining process, but also the Mississippi River system itself would be impacted. At a conservative estimate of \$125,000 per acre of clean up costs, a loss of this levee would result in environmental damages exceeding \$2,000,000,000 (two billion dollars), not including the relocation costs of residents and future loss of agriculturally productive land.

The Metro East Sanitary District (formerly East St. Louis Levee) would leave 13 municipalities, 85,000 acres of urbanized area inundated and over 180,000 residents homeless. The 85,000 acres have hundreds of heavy and light industries, airports, steel

and chemical processing plants, transportation hubs, hospitals, and numerous Superfund sites and property damage is estimated to exceed \$1 Billion. The Fort Chartres levee is one of three levee districts that protect 46,500 acres and approximately 600 residences and farms. Prairie du Rocher Levee protects 13,000 acres and the historic village of Prairie du Rocher with potential damage to Corps of Engineers Kaskaskia Lock and Dam. The levee system that is protected by Grand Tower and Degonia – Fountain Bluff levees protects eight towns and villages, 51,600 acres with estimated property values exceeding \$38 million. There is also a large coal loading facility at Cora, Illinois that would result in high environmental damages to the area. There is also a potential for overtopping the upper flank of the downstream levee system commonly referred to as the Big Five levee system. The Big Five levee system is made up of Preston, Clear Creek, East Cape Girardeau, Miller Pond, and North Alexander levees districts and protects six villages and 43,600 acres which include portions of the Shawnee National Forest and state wildlife area. The Kaskaskia Island levee protects two historic villages and 9,460 acres. Bois Brule levee protects three villages, airport, and 26,060 acres. Two major manufacturers are located in the levee district and employ over 1,000 people from the surrounding area. Safety, property values, and economic viability of the areas protected by poor performing levee reaches is at risk. The high costs for individual slide repairs and long term solutions are well beyond the financial capabilities of the individual levee districts for levee maintenance and operations.

Prehistoric Indians and early settlement historic and cultural resources are found throughout the Alton to Gale levee districts. The Metro East Sanitary District levee protects the Cahokia Mounds. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1982 designated the Cahokia Mounds as a World Heritage Site that was inhabited from about A.D. 700 to 1400. The Fort Chartres levee district protects Fort de Chartres that was erected by the France's colonial government in 1720 and later used by the British military. The Kaskaskia Island levee district protects the historic resources of a French colonial community of Kaskaskia founded in 1703. King Louis XV of France gave a 650-pound church bell to the people of the Illinois Country. The church bell was cast in LaRoche, France in 1741 and is on display. After the American Revolution, Kaskaskia served as the Territorial seat of government between 1809 and 1818 when it became the first Illinois State Capital. One of the houses in Dozaville, a two-story brick residence, was first constructed on the site of the eighteenth century Kaskaskia. In 1818, this structure was the residence of Shadrach Bond, Illinois first Governor. The house was dismantled and rebuilt in its present form in Dozaville after an 1881 Mississippi River channel shift threatened the village.

The present approach of simply repairing individual levee slides puts the system at great risk for flooding during periods with high river stages. Historically, several years pass from the time a levee slide occurs and when funding becomes available to repair the slide, leaving the levee section vulnerable during a flood event. In addition, the present approach is only a short term solution, as levee slides continue to occur in the deficient levee sections. Existing levee slides have encroached into the levee crowns resulting in a breach of the road system, as well as a safety issue for the traveling public. The current

practice of repairing only the slide area does not address the vulnerability of continuous and impending levee slide failures.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* – Repair of the slides is imperative for maintaining the integrity of the flood protection levees. Short term social economic issues would be anticipated with construction of this project.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs, including repair of gravity drains, flood gates and seepage berms. In addition, speculatively, maintaining reliable, trustworthy levee systems between Alton to Gale would promote social and economic growth and development in the floodplain – ultimately this could have positive future impacts to the state of the socioeconomics within this area covering over 150 miles of Mississippi River floodplain.

#### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct Impacts* – Same as the Recommended Alternative (4).

*Indirect, and Cumulative Impacts* – Under these alternatives, the levees would be returned to their designed level of integrity similar to the Recommended Alternative (4). Therefore, future socioeconomic impacts would result from growth and development in the protected floodplain.

### **3.10 Aesthetic Resources**

#### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. Therefore, there would be no immediate aesthetic impacts. However, the consequences of levee failure and breach in the flood protection system could have significant impacts long term impacts on the aesthetics of the floodplain. Tree and vegetation mortality could be widespread and scour and deposition could alter the landscape.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* – Aesthetic impacts would be limited to temporary alteration of levee ground cover and presence of construction equipment. Short-term disturbance of the landscape would occur during construction activities. After revegetation the area would have the same quality as preconstruction.

*Indirect and Cumulative Impacts* – These impacts would be associated with future slide or levee repairs, including repair of gravity drains, flood gates and seepage berms. In addition, speculatively, maintaining reliable, trustworthy levee systems between Alton to Gale would promote social and economic growth and development in the floodplain – ultimately this could have future impacts to the aesthetics of this area covering over 150 miles of Mississippi River floodplain.

#### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct Impacts* – Similar to Recommended Alternative (4) but more extensive short-term damage to the levee groundcover. The contractor would need to clear a minimum of 15 feet from the toe of the levee outward for mixing the soils with hydrated lime. Alternative (3) would require the use of borrow material for re-construction; this would further impact the aesthetics.

*Indirect, and Cumulative Impacts.* Same as Recommended Alternative (4).

### **3.11 Recreation**

#### Future Conditions with No Action

The increase in the number of slides and the expansion of existing slides under the no action alternative would have negative long term impacts on recreation. Also, slides that breach the top of the levee pose a threat to any recreational vehicle traffic. Access to natural areas would be reduced.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - Construction equipment and activities would cause temporary disturbance and access to recreation activities within the vicinity of the repair area.

*Indirect and Cumulative Impacts* - Maintaining reliable, trustworthy levee systems between Alton to Gale would promote increased recreational activities in the floodplain. Increased activity could have adverse impacts on natural areas and wildlife in general.

Future conditions with non-recommended Alternatives 1, 2, and 3 – Same as above.

### **3.12 Hazardous, Toxic and Radioactive Waste Sites (HTRW)**

#### Future Conditions with No Action

Without implementation of the recommended action, no levee repair would be conducted. Therefore, there would be no HTRW concerns.

#### Future Conditions with Recommended Alt. 4

*Direct Impacts* - There are no recognized environmental conditions that would indicate a risk of HTRW contamination within the project area. Soils from previous levee construction are known to be free from hazardous waste.

*Indirect and Cumulative Impacts* –These impacts would be associated with future slide or levee repairs, including repair of gravity drains, pump stations, culverts, flood gates, relief wells and seepage berms. In addition, speculatively, maintaining reliable, trustworthy levee systems between Alton to Gale would promote social and economic growth and development in the floodplain – ultimately this could have future impacts to the aesthetics of this area covering over 150 miles of Mississippi River floodplain.

#### Future Conditions with non-recommended Alternatives 1,2, and/or 3

*Direct, Indirect, and Cumulative Impacts* - Under these alternatives, a Phase I HTRW study would have to be conducted because construction would take place beyond the toe of the levee.

### **3.13 Cumulative Impacts**

#### **3.13.1 History Levee Slides and Repairs.**

The Alton to Gale Levee System began as numerous private small levees built during the depression years. During the 1940's and 1950's the Government created the combined system by raising existing levees and building new levees within the newly established levee districts. Existing gravity drains, culverts, and gates at drainage structures were modified and new ones constructed. Pump stations were engineered and constructed to evacuate interior drainage. Levee seepage controls consisting of relief wells and seepage berms were constructed throughout the levee system during the 1950's and 1960's. All levees have heights ranging between 20 and 25 feet, a crown width of 20 feet and side slopes of 1 vertical on 3 horizontal. Locally available materials were used for construction, which include highly plastic clays.

##### *Years 1968 to 1978*

Between 1968 and 1978, the Corps' repair of the slides consisted of removing all of the material from the slide area to a depth of one to two feet below the slide plane, placing a one-foot thick sand drain and then replacing the original material in a semi-compacted state. The sand drain method was found to be ineffective and was abandoned. After 1975, the slide repair consisted of removing all of the material from the slide area to a depth of one to two feet below the slide plane and adding 4 to 5 percent hydrated lime, by weight, to the material as it was replaced.

##### *Years 1979 to 1984*

Since October 1979, there has been an increase in the number and severity of levee slides. In 1979, the District submitted a request for Public Law 84-99 funds in the amount of \$1,155,000.00 for use in repair of 47 slides in this levee system. In September

1980, the request was disapproved and the District was informed that Construction General Funds would not be provided. Funding was not obtained through FY 82. During the summer and fall of 1983, 119 slides were repaired using Construction General, "Jobs Bill" Funding, for a total estimated cost of \$1,954,000.00. All of the 1983 slides were repaired using the "Lime Stabilization" Method.

#### *Years 1985 to 1993*

In the spring of 1985 a levee inspection of the Alton to Gale levee system documented the existence of 97 new slides that had developed since the completion of repairs under the "Jobs Bill" program. These levee slides were repaired using 100 percent Federal funds. After a levee inspection in 1988, an additional 23 levee slides were identified. Repair of these additional 23 slides was cost-shared with the local levee districts. Most of the levee slides required the excavation of a large portion of the levee embankment slope. Inspection trenches were excavated to determine the actual failure surfaces.

The excavated slide materials were then spread in layers over a stockpile area where the first application of hydrated lime was mixed together with the excavated materials. These soils were allowed to chemically react with the free calcium in the lime for a least a day. The second application of hydrated lime was mixed together with the soils that continued to reduce the plasticity of the soils. The modified-material was then replaced and compacted. No levee slides have occurred in the repair areas that used this method for material modification and stabilization.

#### *Years 1994 and 1996*

After the long inundation of the levees during the 1993 Flood, followed by another inundation during the 1995 Flood, 117 levee slides occurred throughout the Alton to Gale Levee System. During the massive repair efforts to restore flood protection, PL 84-99 authority was sought and approved and 100 percent Federal funding for the repair was approved. Repairs were then made in the Alton to Gale levee system using the above described lime stabilization method. No new levee slides have occurred in these repaired areas.

#### *Years 1997 to 2001*

During the summer and fall of 2001, 44 slides were approved by the ASA(CW) to be repaired using Construction General Funds with an overall cost of \$3.2 million. One hundred percent of these slides occurred within the Prairie Du Rocher, Degognia - Fountain Bluff, and the Grand Tower levee reaches that were all repaired using the described lime stabilization method. No new levee slides have occurred in these repaired areas.

#### *Years 2002 to Present*

Since completion of the latest levee slide repair contract, 17 additional levee slides were discovered in the July 2002 inspection. The back levees along the Big Muddy River have a total of eight slides of which Grand Tower D&L District has five and Degognia-Fountain Bluff D&L District has three. Grand Tower D&L District has two additional

riverside slides that developed in the Mississippi River front levee. The lower flank levee in the East St. Louis & Vicinity D&L District has two landside slides. Kaskaskia Island D&L District has two landside slides. Clear Creek D&L District has two landside slides on the back flank levee. The Wood River D&L District had one landside slide on the lower flank levee that was repaired by levee district in the Fall of 2002. Based on the historical frequency of the development of slides in this levee system, there would be more new slides discovered prior to the approval of this report.

#### *Inventory of Slides*

An inventory has been maintained of all slides that have been repaired by the Federal Government since the year 1961. Records for repairs prior to 1961 are not available. The recorded slides have occurred within the same reaches due to the inappropriate high plasticity clay soils used during the levee construction.

#### *Public Law 84-99 Eligibility Status of Existing Levee System*

All levees in the Alton to Gale levee system are inspected on a yearly basis. St. Louis District personnel perform inspections in the Fall. The levee districts are performing the required operations and maintenance as defined in the original operation and maintenance agreements. All Alton to Gale levee districts have been rated as acceptable or minimally acceptable for Public Law (PL) 84-99 eligibility. Seven of the levee districts (Degognia and Fountain Bluff, Grand Tower, Preston, Clear Creek, East Cape Girardeau, Miller Pond, and North Alexander levee districts) combined protect 14,000 acres of U.S. Forest Service (USFS) Shawnee National Forest. With a significant portion of the 14,000 acres protected by Grand Tower and Degognia and Fountain Bluff levee districts, these districts are without benefit of any tax revenue from these Federal lands. The Illinois Department of Natural Resources (IDNR) owns and operates over 6,000 acres in the Union County State Fish and Wildlife Area that is protected by Preston, Clear Creek, East Cape Girardeau, Miller Pond, and North Alexander levee districts. Clear Creek levee district does not receive any tax revenue from IDNR on the 6,000 acres in their levee district. The USFS and IDNR do provide some minor maintenance to the levee districts but no tax revenue. The financial burden placed on the affected levee districts is tremendous and is worsening since the USFS and IDNR are acquiring additional lands that have provided tax revenue in the past. The PL 84-99 eligibility requirements for well maintained levees are becoming more stringent with revisions in Engineering Regulation 500-1-1, "Civil Emergency Management Program," dated 30 September 2001. The levee districts with levee slides are downgraded even when the problem is not within the levee district's maintenance but due to improper construction using high plasticity clay materials. The levee districts want to maintain their levees for their own protection and maintain their eligibility for PL 84-99 funds if needed during and after a flood. However, levee slides continue and most levee district's infrastructure is old, worn, deteriorated, and in need of replacement or rehabilitation which is and will continue to require the majority of the resources within these levee districts.

In addition to the above work on levees in the Alton to Gale Organized Levee Districts, the St. Louis District, Corps of Engineers has undertaken rehabilitation and reconstruction activities of existing flood protection systems at seven other locations



along the Mississippi River. This includes proposed work at the Wood River Flood Protection System, Chain of Rocks (Madison County, Illinois), City of St. Louis (Missouri), East St. Louis (Madison and St. Clair Counties, Illinois), Prairie du Pont (St. Clair and Monroe Counties, Illinois), Bois Brule (Perry County, Missouri), and Cape Girardeau (Cape Girardeau County, Missouri). Construction has started at two projects (Chain of Rocks, East St. Louis), but the others are in the planning/approval stage. Relief well rehabilitation and installation of new relief wells are construction features common to all these projects, except for Cape Girardeau. The Corps is the sole agency or entity doing this kind of work on flood protection systems along the Mississippi River. All projects are expected to give rise to temporary adverse impacts to air quality and noise. Construction work by others in the vicinity of these projects is likely to occur concurrently with the proposed work (if approved and funded), and is likely to include a variety of industrial, commercial, or transportation-related activities at single locations. No significant cumulative impacts on the environment have been identified.

#### *Levee Maintenance*

Levee maintenance cumulative impacts would be primarily associated with maintenance mowing and are expected to be short-term and minimal. It is the responsibility of local interests to develop an organization capable of providing for the efficient operation and maintenance of the flood control works during normal stages of the river. Levee slopes must be mowed periodically to discourage the growth of weeds and saplings. A good mowing program will enhance a dense sod that will resist wave wash and erosion during periods of high water. Grass on the levee and seepage berms should be kept at a height less than 14 inches. The grass should be cut back to a height of approximately 4 to 6 inches during the growing season. It may be necessary to mow the levee at least two or three times each year to maintain a stand of grass within these prescribed limits. The height of the grass should be at least 8 inches when it becomes dormant prior to winter.

### **3.14 Compliance**

#### **3.14.1 Fish and Wildlife Coordination Act**

Project plans have been coordinated with the U.S. Fish and Wildlife Service, Illinois Department of Natural Resources and Missouri Department of Conservation. Informal scoping and correspondence for this EA took place during the spring of 2008 and again in Fall and Winter 2009, 2010. Within this time frame there was modification to the alternatives based on a Value Engineering Report that recommended the lime/fly-ash alternative. In addition, new slides had developed in the project area. See Appendix A for pertinent correspondence. If implemented, the project, as proposed, would be in full compliance. The St. Louis District is currently waiting to hear from the USFWS regarding the need for a planning aid letter report or coordination act report.

#### **3.14.2 Executive Order 11988 (floodplain management)**

Under this Executive Order, Federal agencies are to "provide leadership and shall take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety,

health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains.” Based on the extent of levee damage that currently exists, it is prudent to repair the levee slides to restore the original level of flood protection. By reducing the future risk of flood loss and minimizing the impacts on existing vegetation in the floodplain, this proposed project is in full compliance with this Executive Order.

### **3.14.3 Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)**

Executive Order 12898 requires “to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report of the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its program, policies and activities on minority population and low-income populations...” All work is within the footprint of the existing levee. The project would not disrupt or displace any residential or commercial structures.

Also included with environmental justice are concerns pursuant to EO 13045, Protection of Children from Environmental Health Risks and Safety Risks. This EO directs Federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children under the age of 18. These risks are defined as “risks to health or to safety that are attributable to products or substances that the child is likely to come into contact with or ingest.” This work has been reviewed for compliance with these orders and it has been determined that the proposed action alternative would not adversely affect or have significant impacts on the health or environment of minority or low-income populations

### **3.14.4 Clean Water Act (Sections 401 and 404) (See discussion under Water Quality and Aquatic Resources, Section 3.3))**

The Lime/Fly-ash injection method could cause short term run-off from erosion if rain should occur during construction. Post-construction, where needed, the levee would be seeded to prevent erosion. As described above (Section 2.2), the Contractor shall construct small earthen berms along the levee toe for the length of the job and adjacent to drainage channels to eliminate accidental entry of slurry into area watercourses or other wetlands. The earthen berms shall be of sufficient size to capture all excess slurry at the levee toe. Any slurry that is running freely on the surface (either around injection rods or out of previous injection holes), is puddled at the toe of the embankment slope, has been spilled, or for any other reason has been judged unsuitable slurry material by the Contracting Officer, shall be defined as wasted slurry. In situations where trees or wetlands would be impacted by berm construction the contractor, as an alternative, would be required to all necessary best management practices including but not limited to the use silt fencing and hay bails, to capture and prevent slurry from going beyond the toe of the levee. In order to ensure that water quality compliance is maintained, the contractor must supply the appropriate information documenting the quality of the fly ash meets all applicable state and federal standards. All aspects of the mixing and injection process

must be documented within an environmental protection plan submittal along with all the BMP's that would be used to minimize the risk associated with this process.

Slurry water shall be clean, fresh, and shall contain no materials deleterious to the slaking process or the lime/fly-ash/soil chemical reactions. If it is intended to use non-potable water, the suitability of non-potable water must be so demonstrated by the Contractor to the Contracting Officer.

No jurisdictional wetlands, waterways or other Waters of the United States would be affected by the proposed access, repair and construction methods associated with this project. As such, the St. Louis District, Regulatory Branch determined that no Section 404 Clean Water Act permits would be required to complete the project as proposed.

#### **3.14.5 Farmland Protection Policy Act of 1981**

The proposed project would not result in the conversion of any prime, unique, or state or locally important farmland to nonagricultural uses.

#### **3.14.6 Executive Order 13186 - Responsibilities of Federal Agencies to Protect Migratory Birds**

These migratory bird conventions impose substantive obligations on the United States for the conservation of migratory birds and their habitats, and through the Migratory Bird Treaty Act, the United States has implemented these migratory bird conventions with respect to the United States. This EO directs Executive departments and agencies to take certain actions to further implement the Act.

The Recommended Alternative (4) would consider migratory birds and take every step practical to minimize impacts to their habitat. No adverse impacts are anticipated.

#### **3.14.7 Executive Order 11990 (Protection of Wetlands)**

Under this Executive Order, Federal agencies shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

The proposed action would be conducted within the footprint of the levee – from the toe to the levee crest. No staging areas or other construction areas would encroach or impact wetlands. Therefore, the proposed levee repairs are in full compliance with this Executive Order.

#### **3.14.8 Bald and Golden Eagle Protection Act of 1940**

On August 9, 2007 the bald eagle was removed from the federal list of threatened and endangered species. It remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The Bald and Golden Eagle Protection Act prohibits unregulated take of bald eagles. The Fish and Wildlife Service recently

finalized a rule defining “take” that includes “disturb.” “Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior” (USFWS 2007).

All repairs under the Recommended Alternative (4) would take place within the footprint of the existing levee. Currently, there are no known nest trees in the vicinity of any repair areas. Repair activities are not anticipated to disturb Bald or Golden Eagles.

#### **3.14.9 Environmental Regulatory Constraints**

The Recommended Alternative (4) was subject to compliance review with all applicable environmental regulations and guidelines. The National Environmental Policy Act would be considered as in partial compliance until the District Engineer’s signing of the Finding of No Significant Impact. The National Historic Preservation Act would be considered as in partial compliance until there is concurrence from the State Historic Preservation Officer on the District’s EA conclusions.

<b>Federal Policies</b>	<b>Compliance</b>
Bald Eagle Protection Act, 42 USC 4151-4157	Full
Clean Air Act, 42 USC 7401-7542	Full
Clean Water Act, 33 USC 1251-1375	Full
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	Full
Endangered Species Act, 16 USC 1531-1543	Full
Farmland Protection Policy Act, 7 USC 4201-4208	Full
Fish and Wildlife Coordination Act, 16 USC 661-666c	Full
Food Security Act of 1985, 7 USC varies	Full
Migratory Bird Treaty Act, 1918	Full
Land and Water Conservation Fund Act, 16 USC 460d-4601	Full
National Environmental Policy Act, 42 USC 4321- 4347	Partial <sup>1</sup>
National Historic Preservation Act, 16 USC 470 et seq.	Partial <sup>2</sup>
Noise Pollution and Abatement Act, 42 USC 7691-7642	Full
Resource, Conservation, and Rehabilitation Act, 42 USC 6901-6987	Full
Rivers and Harbors Appropriation Act, 33 USC 401-413	Full
Water Resources Development Acts of 1986 and 1990	Full
Floodplain Management (EO 11988 as amended by EO 12148)	Full
Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities (EO 11282 as amended by EO's 11288 and 11507)	Full
Protection and Enhancement of Environmental Quality (EO 11991)	Full
Protection and Enhancement of the Cultural Environment (EO 11593)	Full
Protection of Wetlands (EO 11990 as amended by EO 12608)	Full

Full compliance: having met all requirements of the statute for the current stage of planning

1 Full compliance to be achieved with the District Engineer's signing of the Finding of No Significant Impact

2 Full compliance to be achieved with the State Historic Preservation Officer's concurrence in the District's EA conclusions.

***Table EA-3. Compliance review with all applicable environmental regulations and guidelines***

### **3.14.10 Relationship between Short-Term Use and Long-Term Productivity**

The local short-term impacts of the recommended action and the use of resources for it are consistent with the maintenance and enhancement of long-term productivity for the local area, region, and nation. Creation of the project would support growth and development of employment and population in the region. Levee integrity is critical for floodplain protection.

### **3.14.11 Irreversible or Irretrievable Commitments of Resources**

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from use or destruction of a specific

resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site). The proposed levee repairs would result in few direct and indirect commitments of resources; these would be related primarily to on site construction and future operation and maintenance.

Construction would require the expenditure of materials that are generally not retrievable - fossil fuels, labor, and fly ash construction materials. Construction would require a large, one-time investment of federal funds that are not retrievable. The commitment of these resources is based on the concept that residents both within the project area, as well as the region and nation, would benefit by improvements in the integrity of the levees. The levee repairs would provide a positive influence on the economy of the local area and region. No irreversible or irretrievable commitment has been identified which would have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative. No commitment of resources has occurred that would prejudice the selection of any alternative before making a final decision on this project.

## **LIST OF PREPARERS**

<b>St. Louis District</b>	<b>Role</b>
Ms. Marilyn Lowe	Project Manager
Mr. Keith McMullen, Regulatory Specialist	Regulatory Permits
Mr. James Barnes, District Archaeologist	Archeological Compliance
Mr. Kenneth Cook, Biologist	Environmental Assessment

## **COORDINATION WITH OTHER STATE AND FEDERAL AGENCIES**

This draft EA and FONSI would be provided to the following State and Federal agencies for their review, comments, and concurrence during the 30 day public comment period.

U.S. Fish and Wildlife Service	State and local elected officials
U.S. Environmental Protection Agency	Levee Districts
U. S. Forest Service	County Commisioners
Federal Emergency Management Agency	Local County Boards
Natural Resources Conservation Service	National Corn Growers Association
Illinois Department of Natural Resources	Natinal Grain and Feed Associatino
Illinois Environmental Protection Agency	American Land Conservancy
Illinois State Historic Preservation Office	The Nature Conservancy
Illinois Emergency Management Agency	Sierra Club, Midwest Office
Illinois Department of Transportation	Izaak Walton League, Midwest Office
Missouri Department of Conservation	
Missouri Emergency Management Agency	

To assure compliance with the National Environmental Policy Act, Endangered Species Act, and other applicable environmental laws and regulations, coordination with these

agencies would continue as required throughout the planning and construction phases of the proposed levee repairs.

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**DRAFT FINDING OF NO SIGNIFICANT IMPACT  
REPAIR OF FLOOD CONTROL WORKS  
ALTON-TO-GALE ORGANIZED LEVEE DISTRICTS, ILLINOIS**

The U.S. Army Corps of Engineers, St. Louis District (Corps), proposes to address the correction of a design deficiency involving the use of inappropriate, high plasticity clays during the construction of eleven levee reaches in the Alton-to-Gale Organized Levee Districts, Illinois and Missouri.

I have reviewed the information in this Environmental Assessment, along with data obtained from Federal and State agencies having jurisdiction by law or special expertise, and from the interested public. I find that repair of portions of the Alton-to-Gale Organized Levee Districts due to design deficiency is essential to maintaining levee integrity and would not significantly affect the quality of the human environment.

This finding of no significant impact is based on the following factors:

1. Evaluation of other pertinent data and information on levee damage repairs. As part of this evaluation, I have considered the following project alternatives.
  - a. Four practicable alternative engineering solutions for repairing reaches of levees experiencing excessive sliding.
  - b. No Federal action ("No Action" Alternative).
2. The possible consequences of the Lime/Fly-ash injection method, Recommended Alternative (4), have been studied for physical, environmental, cultural, social and economic effects, and engineering feasibility. Significant factors evaluated as part of my review include.
  - a. If no repairs are accomplished, the levee system would continue to deteriorate to the point that protection would be jeopardized during the next flood event of any significance.
  - b. Under the Lime/Fly-Ash injection method there is a possibility that some excess slurry may spill from the injection holes. The Contractor shall construct earthen berms or other adequate protection along the levee toe for the length of the job and adjacent to drainage channels to eliminate accidental entry of slurry into area watercourses or other wetlands. The earthen berms shall be of sufficient size to capture all excess slurry at the levee toe. Any slurry that is running freely on the surface (either around injection rods or out of previous injection holes), is puddled at the toe of the embankment slope, has been spilled, or for any other reason has been judged unsuitable slurry material by the Contracting Officer, shall be defined

as wasted slurry. In situations where trees or wetlands would be impacted by berm construction the contractor, as an alternative, would be required to all necessary BMP's including but not limited to the use silt fencing and hay bails, to capture and prevent slurry from going beyond the toe of the levee. In order to ensure that water quality compliance is maintained, the contractor must supply the appropriate information documenting the quality of the fly ash meets all applicable state and federal standards. All aspects of the mixing and injection process must be documented within an environmental protection plan submittal along with all the BMP's that would be used to minimize the risk associated with this process. All waste slurry would be disposed of in an environmentally safe manner.

- c. No significant adverse terrestrial impacts would be expected. Vegetation (cool season grasses) and possibly some wildlife (small mammals) would be impacted during construction.
- d. No Federally endangered or threatened species would be adversely impacted by the levee repairs.
- e. Repair activities would cause temporary erosion, noise, and air pollution. Proper construction guidelines and soil management techniques would minimize these impacts. Impacts would be short term and minor. The aesthetic and recreational quality of the area would be temporarily reduced by construction activities. Shortly after construction completion, aesthetic and recreational quality would return to pre-construction conditions. Upon completion of the repairs, all construction equipment would be removed.
- f. Construction/repair activities associated with this project would have no significant effect upon archaeological remains or historic properties. In the event that unknown archaeological remains or historic properties are encountered in the construction/repair process, a Programmatic Agreement has been executed with the Illinois Historic Preservation Agency to ensure that any impacts are avoided or mitigated.
- g. No adverse socioeconomic impacts or impacts to prime farmland from the proposed levee repairs would occur.
- h. No jurisdictional wetlands, waterways or other Waters of the United States would be affected by the proposed access, repair and construction methods associated with this project. As such, the St. Louis District, Regulatory Branch determined that no Section 404 Clean Water Acts permits would be required to complete the project as proposed.

3. Based on my analysis and evaluation of the alternative courses of action presented in this Environmental Assessment, I have determined that repairing the levee slides using the lime/fly-ash injection technique would not have significant effects on the quality of the human environment. Therefore, it is my determination that an Environmental Impact Statement is not required.

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Date

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Thomas E. O'Hara, Jr.  
Colonel, U.S. Army  
District Engineer

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# **ENVIRONMENTAL ASSESSMENT**

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## **Alton to Gale Organized Levee Districts, Illinois and Missouri (Continuing, Deficiency Corrections) Letter Report**

### **APPENDIX A**

#### **Pertinent Correspondence**

28 July 2008

Planning, Programs, and  
Project Management Division,  
Environmental Branch

#### SEE DISTRIBUTION LIST

The St. Louis District of the U.S. Army Corps of Engineers is proposing the correction of a deficiency in the construction of levees within the Alton-to-Gale Organized Levee Districts and is preparing an Environmental Assessment for the work. Certain reaches of this levee system have experienced levee slides, generally attributable to the properties of the highly plastic (CH) clays from which the levees were constructed. These clays have a high shrink-swell potential which allows the formation of deep cracks in the levees during dry periods. These cracks then fill with water from rain, snowmelt, and floods, producing internal hydrostatic pressures within lower portions of the levee embankment. The additional water in the clay reduces its strength and produces an unstable (sliding) embankment compromising the integrity of the levee. The high plasticity soils must be replaced or modified to lower the risk of failure and meet the standard Corps of Engineers criteria for flood control projects. The St. Louis District is of the opinion that these levees will continue to experience slides because of the nature of the embankment material. Furthermore, the cost of repairing these levees in the future is considered to be beyond the financial capability of the levee districts. If future slides are not corrected, the integrity of the levee systems will be weakened possibly leading to breaches during periods of high water.

No jurisdictional wetlands, waterways or other Waters of the United States will be affected by the proposed access, repair and construction methods associated with this project. As such, the St. Louis District, Regulatory Branch determined that no Section 404 Clean Water Acts permits will be required to complete the proposed project.

Repair of the levee slides consists of excavating to the required widths and depths, mixing the excavated soil with hydrated lime and replacing. All work would be done within the footprint of the levee, that is; no encroachment or impacts to adjacent lands/farm lands will be necessary. Heavy machinery will operate primarily from the berm of the levee. Environmental impacts are planned to be minimal.

The local sponsors have all performed the required operation and maintenance on the various levees, and it seems abundantly clear that the current problem with slides is not the result of improper maintenance, and thus any attempt to force the local sponsor to undertake this work would not be justified. The proposed work would consist of the repair of the existing levees. There are no proposed new project structures, and the scope or function of the authorized project

will be maintained, not changed. The following drainage and levee districts are included in the project:

<b>Alton to Gale Levee Districts</b>	<b>Levee Repair Reach Stationing (Sta)</b>	<b>Repair Length</b>
Bois Brule D&LD	Sta 1385+00 to Sta 1420+00	3,500 LF
Clear Creek D&LD	Sta 272+00 to Sta 380+00	10,800 LF
Columbia D&LD		
Degognia - Fountain Bluff D&LD	Sta 410+00 to Sta 420+00	1,000 LF
	Sta 790+00 to Sta 826+00	3,600 LF
	Sta 936+40 to Sta 1069+40	13,300 LF
East Cape Girardeau D&LD	Sta 355+00 to Sta 400+00	4,500 LF
Fort Chartres and Ivy Landing D&LD	Sta 595+00 to Sta 625+00	3,000 LF
Harrisonville and Ivy Landing		
Grand Tower D&LD	Sta 58+00 to Sta 110+00	1,000 LF
	Sta 425+00 to Sta 442+00	1,700 LF
	Sta 628+00 to Sta 936+40	30,840 LF
North Alexander		
Kaskaskia Island D&LD	Sta 480+00 to Sta 496+00	1,600 LF
Miller Pond, IL		
Stringtown, IL		

MESD (E. St. Louis D&LD)	Sta 1390+00 to Sta 1530+00	14,000 LF
Prairie du Rocher D&LD	Sta 58+00 to Sta 110+00	5,200 LF
	Sta 700+00 to Sta 840+00	14,000 LF
Prairie du Punt and Fish Lake D&LD		
Preston D&LD	Sta 0+00 to Sta 25+00	2,500 LF
Wood River D&LD	Sta 198+00 to Sta 218+00	2,000 LF
<b>Alton to Gale Levee Districts</b>	<b>Total Length</b>	<b>112,540 LF</b>

[Counties: Madison, St. Clair, Monroe, Randolph, Jackson, Union, Alexander]

Please inform us of any reports, studies, or other research concerning environmental resources in the project vicinity that may be of use in analyzing potential impacts of the project. Please provide any comments you may have regarding this project within 30 days of receipt of this letter. Address your comments, concerns, or questions to Mr. Ken Cook of our Environmental Analysis Branch, telephone 314-331-8495. Written comments may be sent to our address above, ATTN: Environmental Branch (PM-E, Cook).

Sincerely,

Thomas M. Keevin, Ph.D  
Chief, Environmental Branch

U.S. Fish and Wildlife Service  
U.S. Environmental Protection Agency  
Federal Emergency Management Agency  
Natural Resources Conservation Service  
Illinois Department of Natural Resources  
Illinois State Historic Preservation Office  
Illinois Emergency Management Agency  
Missouri Department of Conservation  
Missouri Department of Natural Resources  
Missouri State Historic Preservation Officer



## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

Marion Illinois Suboffice (ES)

8588 Route 148

Marion, IL 62959

(618) 997-3344

August 7, 2008

Kenneth M. Cook, PM-E  
U.S. Army Corps of Engineers  
St. Louis District  
1222 Spruce Street  
St. Louis, Missouri 63103-2833

Dear Mr. Cook:

This is in response to your request for a current list of threatened and endangered species that may be present in the Alton-to-Gale Levee Project. The proposed project areas are located in the Alton-to-Gale Organized Levee Districts in Madison, St. Clair, Monroe, Randolph, Jackson, Union, and Alexander Counties, Illinois. The proposed project includes correcting a deficiency in the construction of levees within the Levee Districts. These comments are provided under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); the Endangered Species Act of 1973, as amended; and, the National Environmental Policy Act.

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal agencies are required to obtain from the Fish and Wildlife Service (Service) information concerning any species, listed or proposed to be listed, which may be present in the area of proposed action. Therefore, we are furnishing you the following list of species which have ranges that include the project area and have included background information for each species in an attachment:

<u>Classification</u>	<u>Common Name (Scientific Name)</u>	<u>Habitat</u>
Endangered	Gray bat ( <i>Myotis grisescens</i> )	Caves; feeding-rivers/ reservoirs adjacent to forests
Endangered	Indiana bat ( <i>Myotis sodalis</i> )	Caves, mines; small stream corridors with well developed riparian woods; upland and bottomland forests



<u>Classification</u>	<u>Common Name (Scientific Name)</u>	<u>Habitat</u>
Endangered	Least tern ( <i>Sterna antillarum</i> )	Bare alluvial and dredge spoil islands
Endangered	Pallid sturgeon ( <i>Scaphirhynchus albus</i> )	Rivers
Endangered	Illinois cave amphipod ( <i>Gammarus acherondytes</i> )	Karst caves & streams
Threatened	Decurrent false aster ( <i>Boltonia decurrens</i> )	Disturbed alluvial soils
Candidate	Sheepnose ( <i>Plethobasus cyphus</i> )	Rivers

There is no designated critical habitat in the project area at this time.

We do not have any comments on the scope of this project at this time. Thank you for the opportunity to comment on the scope of this project and provide information concerning threatened and endangered species. We look forward to reviewing the Environmental Assessment. If you have any questions, please contact Matt Mangan of my staff at (618) 997-3344, ext. 345.

Sincerely,

Joyce A. Collins  
Assistant Field Supervisor

cc: IDNR (Schanzle)  
FWS (Cail, Ellis, Maybery, Westphall)

**FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES  
INFORMATION FOR ALEXANDER, JACKSON, MADISON, MONROE, RANDOLPH,  
ST. CLAIR, AND UNION COUNTIES, ILLINOIS**

The **gray bat** (*Myotis grisecens*) is listed as endangered and occurs in several Illinois and Missouri counties where it inhabits caves both during summer and winter. This species forages over rivers and reservoirs adjacent to forests. A search for this species should be made prior to any cave impacting activity.

The endangered **Indiana bat** (*Myotis sodalis*) has been noted as occurring in several Illinois and Missouri counties. Indiana bats are considered to potentially occur in any area with forested habitat. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or in cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of tree does not appear to influence whether Indiana bats utilize a tree for roosting provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions, such as temperature and precipitation.

During the summer, Indiana bats frequent the corridors of small streams with well-developed riparian woods, as well as mature bottomland and upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of crop lands, along wooded fence rows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age and sex and ranges up to 81 acres (33 ha). To avoid impacting the species, tree clearing activities should not occur during the period of April 1 to September 30. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from April 1 to November 15. If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine if Indiana bats are present. A search for this species should be made prior to cave impacting activities.

The **least tern** (*Sterna antillarum*) is listed as endangered and occurs in several Illinois counties along the Mississippi and Ohio Rivers. It nests on bare alluvial or dredge spoil islands and sand/gravel bars in or adjacent to rivers, lakes, gravel pits and powerplant cooling ponds. It nests in colonies with other least terns and sometimes with the piping plover. This species forages in shallow water areas along the river and in backwater areas, such as side channels and sloughs. Foraging habitat must be located in close proximity to nesting habitat.

The endangered **pallid sturgeon** (*Scaphirhynchus albus*) is found in the Mississippi River downstream of Melvin Price Locks and Dam. Pallid sturgeon are adapted to large rivers with extensive micro-habitat diversity, turbid water, braided channels, irregular flows and flood cycles. Little is known of its micro-habitat preferences, however, it is suspected that sand/gravel bars and the mouths of major tributaries may be utilized for spawning. This species feeds on aquatic invertebrates and small fish.

The **Illinois cave amphipod** (*Gammarus acherondytes*) is listed as endangered in Monroe and St. Clair Counties, Illinois. It is currently known to occur in only a few cave streams of the Illinois sinkhole plain in southwestern Illinois. The contamination of groundwater is probably the greatest threat to this species.

The **decurent false aster** (*Boltonia decurrens*) is listed as threatened and is known to occur in several Illinois counties in the floodplain of the Illinois and Mississippi River. It is considered to potentially occur in any county bordering the Illinois River and Jersey, Madison and St. Clair Counties bordering the Mississippi River. It occupies disturbed alluvial soils in the floodplains of these rivers. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law.

The **Sheepnose** (*Plethobasus cyphus*) is listed as a candidate species and occurs in rivers. This species inhabits gravel or mixed sand and gravel habitats in medium to large rivers.

## Cook, Kenneth M MVS

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**From:** Schanzle, Bob [Bob.Schanzle@Illinois.gov]  
**Sent:** Tuesday, January 19, 2010 2:35 PM  
**To:** Lowe, Marilyn H MVS; Cook, Kenneth M MVS  
**Cc:** Kieninger, Tara; Ballard, Scott; Matthew\_Mangan@fws.gov  
**Subject:** RE: Alton-Gale Levee Repairs

**Follow Up Flag:** Follow up  
**Flag Status:** Green

**Attachments:** Alton to Gale.wpd; Alton to Gale.doc



Alton to Gale.wpd (8 KB)



Alton to Gale.doc (8 KB)

Marilyn and Ken:

Attached for your information is a listing of the identified Illinois natural areas and threatened/endangered species occurring in close proximity to the various levee repair sites between Alton and Gale. I hope this proves useful. Please contact me by phone or e-mail if you have questions or I can be of any other assistance.

Sincerely,

Robert W. Schanzle  
Permit Program Manager  
IDNR, Office of Realty and Environmental Planning

Ph: 217-785-4863  
bob.schanzle@illinois.gov

-----Original Message-----

**From:** Lowe, Marilyn H MVS [mailto:Marilyn.H.Lowe@usace.army.mil]  
**Sent:** Friday, January 08, 2010 7:40 AM  
**To:** Schanzle, Bob  
**Cc:** Cook, Kenneth M MVS  
**Subject:** FW: Alton-Gale Levee Repairs

Bob,

I am the project manager for the Alton to Gale Project. Ken is going to be out of the office for the next week or two, so he asked me to respond to your questions to ensure we addressed your concerns and provided you with the information you are looking for while he is out.

The recommended plan that we are addressing is using the lime/fly ash injection that is discussed in the draft EA. This process is quite different than was used in the previous levee repairs. In the past, we utilized a lime stabilization process that required considerable space to treat the clay material. In the new recommended approach, all work can be accomplished from the top and slopes of the levee to inject the lime/fly ash material. There is however a mobilization area required to mix the lime/fly ash slurry. It is anticipated the project (within each levee district) will require a 2-acre temporary construction easement just off of the levee to complete the lime/fly-ash injection process, but it is likely that process can be accomplished on levee right-of-way using a track-mounted flat bed vehicle.

Also, attached are project maps for each area to be repaired.

Please let me know if you need additional information.

Thanks,  
Marilyn

Marilyn H. Lowe  
Project Manager, PM-F  
USACE, St. Louis District  
314-331-8618

-----Original Message-----

From: Cook, Kenneth M MVS  
Sent: Thursday, January 07, 2010 11:57 AM  
To: Lowe, Marilyn H MVS  
Subject: FW: Alton-Gale Levee Repairs

-----Original Message-----

From: Schanzle, Bob [mailto:Bob.Schanzle@Illinois.gov]  
Sent: Thursday, January 07, 2010 9:30 AM  
To: Cook, Kenneth M MVS  
Cc: matthew.mangan@fws.gov; Ballard, Scott  
Subject: Alton-Gale Levee Repairs

Ken,

As long as the repair activities are restricted to the existing levee footprint, significant adverse impacts to listed species may be unlikely. However, I seem to recall a couple of instances during the emergency repair reviews last year where identified E/T habitat came right up to the toe of the levee, and there's always the potential that bald eagles, Mississippi kites, etc. might nest adjacent to a repair site and be subject to disturbance. Also, section 3.8.3 of your draft EA states that the placement of access roads, equipment staging areas, and debris collection areas hasn't yet been determined, so there could be a possibility of impacts there. The bottom line is that we can't say this early in the process that no adverse impacts will occur.

Would it be possible to get site-specific aerials and/or maps of the various sites where repairs are proposed? These would allow us to determine fairly quickly if there are any occurrence records located in close proximity and if there's any cause for concern. Beyond that, if the final EA states that all work will be performed from within the levee footprint and includes criteria for the placement of access roads, staging areas, etc. to prevent habitat disturbances, there should be no major problems. Time restrictions to protect nesting animals might also be beneficial.

Regards, Bob S.

Robert W. Schanzle  
Permit Program Manager  
IDNR, Office of Realty and Environmental Planning

Ph: 217-785-4863  
bob.schanzle@illinois.gov

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# **ENVIRONMENTAL ASSESSMENT**

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## **Alton to Gale Organized Levee Districts, Illinois and Missouri (Continuing, Deficiency Corrections) Letter Report**

### **APPENDIX B**

#### **Illinois and Missouri Species of Concern**

The Boise Brule levee is located in Perry County, Missouri, and Randolph County, Illinois and runs along the right descending bank of the Mississippi River. It is bordered on the southeast by Cinque Hommes Creek. It extends from Mississippi River Mile 94.0 to River Mile 111.0. It is just south of the confluence of the Mississippi and Kaskaskia rivers and directly across from the confluence of the Mississippi and St. Mary's rivers. The following is a list of Missouri State Endangered, S1, and S2 species occurring in Perry County (Missouri species and communities of conservation concern checklist, Missouri Department of Conservation, January 2009).

- **STATE ENDANGERED**
- [BITTERN, AMERICAN \(\*BOTAURUS LENTIGINOSUS\*\)](#)
- [EGRET, SNOWY \(\*EGRETTA THULA THULA\*\)](#)
- [FALCON, PEREGRINE \(\*FALCO PEREGRINUS TUNDRIUS\*\)](#)
- [HARRIER, NORTHERN \(\*CIRCUS CYANEUS\*\)](#)
- [RAIL, KING \(\*RALLUS ELEGANS\*\)](#)
- [TERN, INTERIOR LEAST \(\*STERNULA ANTILLARUM ATHALASSOS\*\)](#)
- [CHUB, FLATHEAD \(\*PLATYGOBIO GRACILIS\*\)](#)
- [STURGEON, LAKE \(\*ACIPENSER FULVESCENS\*\)](#)
- [STURGEON, PALLID \(\*SCAPHIRHYNCHUS ALBUS\*\)](#)

#### S1

- [SLENDER PONDWEED \(\*POTAMOGETON PUSILLUS PUSILLUS\*\)](#)

#### S2

- [SHRIKE, LOGGERHEAD \(\*LANIUS LUDOVICIANUS MIGRANS\*\)](#)
- [SORA \(\*PORZANA CAROLINA\*\)](#)
- [MINNOW, PLAINS \(\*HYBOGNATHUS PLACITUS\*\)](#)
- [MINNOW, WESTERN SILVERY \(\*HYBOGNATHUS ARGYRITIS\*\)](#)
- [SHAD, ALABAMA \(\*ALOSA ALABAMAE\*\)](#)

- SHINER, GHOST (*NOTROPIS BUCHANANI*)
- RABBIT, SWAMP (*SYLVILAGUS AQUATICUS AQUATICUS*)
- PALE GREEN ORCHID (*PLATANThERA FLAVA*)



## **Illinois State listed species records.**

**Wood River Drainage and Levee District.** T5N, R9W, Sec. 28, Madison County.

There are no occurrence records in the immediate vicinity.

**MESD Drainage and Levee District.** T1N, R10W, Sec. 10, 11, 12 & 13, St. Clair County.

There are no occurrence records in the immediate vicinity.

**Fort Chartres Drainage and Levee District.** T5S, R9W, Sec. 28, Randolph County.

There are no occurrence records in the immediate vicinity.

**Prairie du Rocher Drainage and Levee District.** T6S, R8W, Sec. 14, 23 & 26, Randolph County.

There are no occurrence records in the immediate vicinity.

**Kaskaskia Island Drainage and Levee District - Site 1.** T7S, R7W, Sec. 5, 6 & 8, Randolph County.

There are no occurrence records in the immediate vicinity.

**Kaskaskia Island Drainage and Levee District - Site 2.** T7S, R7W, Sec. 16, Randolph County.

There are no occurrence records in the immediate vicinity.

**Bois Brule Drainage and Levee District.** Missouri.

No information available.

**Degonia Drainage and Levee District - Site 1.** T9S, R5W, Sec. 12 & 13, Jackson County.

There are no occurrence records in the immediate vicinity.

**Degonia Drainage and Levee District - Site 2.** T9S, R4W, Sec. 35 & 36, Jackson County.

There are no occurrence records in the project footprint. The Eastern wood rat (*Neotoma floridana*), timber rattlesnake (*Crotalus horridus*), and yellow honeysuckle (*Lonicera flava*) occur on the adjacent slope of fountain Bluff.

**Degonia Drainage and Levee District - Site 3.** T9S, R3W, Sec. 27, 28 & 33, Jackson County.

The Indiana bat (*Myotis sodalis*) has been reported approximately 2/3 mile west of the levee. Pole manna grass (*Torreyochloa pallida*) has also been reported just west of the levee.

**Grand Tower Drainage and Levee District - Site 1.** T10S, R3W, Sec. 4, 9, 16, 21, 28 & 33, Jackson County.

The Indiana bat (*Myotis sodalis*) has been reported at two locations near the levee. The rice rat (*Oryzomys palustris*) and cynosciadium (*Cynosciadium digitatum*), a plant, also occur nearby.

**Grand Tower Drainage and Levee District - Site 2.** T10S, R4W, Sec. 13, 23 & 24, Jackson County.

The Bake Oven - Backbone North Geological Area and Backbone South Geological Area INAI sites lie between the two levee sections to be repaired at this location.

**Grand Tower Drainage and Levee District - Site 3.** T11S, R3W, Sec. 9, Union County.

The levee borders a portion of the LaRue-Pine Hills Research Natural Area. Listed species in the immediate vicinity include the golden mouse (*Ochrotomys nuttalli*), eastern wood rat (*Neotoma floridana*), redspotted sunfish (*Lepomis miniatus*), bantam sunfish (*Lepomis symmetricus*), starhead topminnow (*Fundulus dispar*), Arkansas manna grass (*Glyceria arkansana*), willow oak (*Quercus phellos*), flathead snake (*Tantilla gracilis*) and Mississippi green watersnake (*Nerodia cyclopion*).

**Grand Tower Drainage and Levee District - Site 4.** T11S, R3W, Sec. 17 & 18, Union County.

There are no occurrence records in the immediate vicinity.

**Clear Creek Drainage and Levee District.** T13S, R2W, Sec. 31, Union County and T14S, R3W, Sec. 1, Alexander County.

The levee borders the Clear Creek INAI site. Listed species include the bantam sunfish (*Lepomis symmetricus*), bigeye shiner (*Notropis boops*), and rice rat (*Oryzomys palustris*).

**East Cape Girardeau Drainage and Levee Dist. - Site 1.** T14S, R4W, Sec. 25 & 36, Alexander Co.

There are no occurrence records in the immediate vicinity.

**East Cape Girardeau Drainage and Levee Dist. - Site 2.** T14S, R3W, Sec. 33, Alexander Co.

There are no occurrence records in the project footprint. The bantam sunfish (*Lepomis symmetricus*) has been reported just downstream from the project site.